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H<sub>3</sub>PO<sub>4</sub>, or HPF<sub>6</sub>. ORGANIC SULFUR COMPOUNDS;  
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- 01976 (PE--221627-3) REMOVAL OF PYRITE FROM  
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SODIUM SULFATES; SODIUM OXIDES; ALUMINIUM OXIDES;  
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- 02012 SULFUR DIOXIDE COLLECTION SYSTEM. Zey, A.F.; Przygocki, J.V.; Van Huffel, P. (to American Standard Inc., New York). US Patent 3,745,751. 17 Jul 1973. Filed date 26 Oct 1970. 5p.  
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Effectiveness for desulfurization of flue gases. FLUE GAS;DESULFURIZATION;REMOVAL;SULFUR DIOXIDE;ADSORPTION;ACTIVATED CARBON
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Initial results of testing prototype wet lime-limestone scrubbing facility for removing  $SO_2$  particulates from flue gas. SULFUR DIOXIDE; REMOVAL;SCRUBBING;COAL GAS;PERFORMANCE TESTING; DESULFURIZATION;CALCIUM CARBONATES;FLUE GAS; CALCIUM OXIDES
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- 02019 SUCCESSFUL REDUCTION OF SULPHUR DIOXIDE TO SULFUR ON A LARGE SCALE AND THE APPLICATION

- OF THIS PROCESS TO EMISSIONS FROM POWER STATIONS. Aust, W.D. V.G.B.; 23: 521-5(Aug 1973). (In German).  
SO<sub>2</sub> is reduced with natural gas to elemental sulfur and H<sub>2</sub>S to be used with W-L-SO<sub>2</sub>-removal process. FLUE GAS; DESULFURIZATION; REMOVAL; SULFUR DIOXIDE; REDUCTION; NATURAL GAS; SULFUR; HYDROGEN SULFIDES; W-L SULFUR DIOXIDE RECOVERY PROCESS
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COAL; DESULFURIZATION; REMOVAL; PYRITES; FLOTATION
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- 02137 NEUTRALIZATION OF ACID GAS COMPONENTS. Inoue, G.; et. al. (to Osaka Kiln Co., Ltd.). German (FRG) Patent 2,330,735. 21 Mar 1974. Filed date 29 Aug 1972. 21p.  
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- 02138 PURIFICATION OF SULFUR DIOXIDE-CONTAINING WASTE GASES WITH SULFUR RECOVERY. Deschamps, A.; Renault, P.; Dezael, C. (to Institut Francais du Pétrole, des Carburants et Lubrifiants). German (FRG) Patent 2,346,083. 28 Mar 1974. Filed date 22 Sep 1972. 12p.  
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- 02140 HIGH-SULFUR COAL FOR GENERATING ELECTRICITY. Dunham, J.T.; Rampack, C.; Henrie, T.A. (Bureau of Mines, Washington, DC). Science; 184: No. 4134, 346-351(19 Apr 1974).  
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- 02141 FLOTATION OF PYRITE FROM COAL. Miller, K.J. (to US Dept. of Interior). US Patent 3,807,557. 30 Apr 1974. Filed date 11 Aug 1972. 4p.  
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- 02144 REACTIVITY OF SO<sub>2</sub> WITH SUPPORTED METAL OXIDE: ALUMINA SORBENTS. Vogel, R.F.; Mitchell, B.R.; Massoth, F.E. (Gulf Research and Development Co., Pittsburgh). Environ. Sci. Technol.; 8: No. 5, 432-436(May 1974). 343°C. COPPER OXIDES; STRONTIUM OXIDES; NITRATES; STACK DISPOSAL; REACTIVITY; SULFUR DIOXIDE; CHEMISORPTION; METALS; OXIDES; REMOVAL; DESULFURIZATION; ALUMINIUM OXIDES; MONITORING; ADSORPTION; AIR POLLUTION; SORPTIVE PROPERTIES; SODIUM; NITROGEN; OXYGEN; WATER
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- 02151 PRODUCTION OF LOW SULFUR COAL. Dillon, T.J.; Warsaw, A. (to Chemical Construction Corp., New York, NY). US Patent 3,824,084. 16 Jul 1974. Filed date 10 Oct 1972. 6p.  
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Cold water is used as an absorbent (1881). FLUE GAS; DESULFURIZATION; REMOVAL; SULFUR DIOXIDE; CHEMISORPTION; WATER; MEDIUM TEMPERATURE
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## Hydrogenation

REFER ALSO TO CITATIONS 62, 98, 110, 161, 170, 182, 188, 264, 376, 414, 724, 1601, 1633, 1756, 3179, 3251, 3356, 3654, 3693, 3853, 3864, 3980, 4143, 4159, 4161, 4593, 4920, 4921, 4946, 5022, 5027, 5172, 5351, 5373, 5633, 5636, 5662, 5683, 5716, 5730, 5763, 5777, 5787, 5788, 5794, 5797, 5798, 5811, 5816, 5825, 5837, 5848, 5871, 5883, 5899, 5902, 5903, 5924, 5952, 5954, 5959, 6050, 6056, 6077, 6140, 6210, 6212, 6273, 6392, 6393, 6434, 6532, 6563, 6565, 6566, 6567, 6712, 6719, 6723, 6725, 6731, 6742, 6794, 6795, 6796, 6799, 6802, 6807, 6853, 6854, 6937, 6967, 6974, 6976, 7010, 7019, 7043, 7057, 7080, 7097, 7153, 7163, 7166, 7191, 7214, 7232, 7248, 7253, 7254, 7255, 7284, 7300, 7327, 7329, 7346, 7366, 7367, 7368, 7381

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Coal mixed with fused metallic Sn, hydrogenated at 500°C and 100 atm. COAL;LIGNITE; HYDROGENATION; MIXTURES; HIGH PRESSURE; TIN; HIGH TEMPERATURE
- 02156 MOTOR FUEL. Hofsaess, M. (to Erdoel- und Koehle-Verwertung AG). German(FRG) Patent 529,537. 12 Jun 1926.  
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- 02157 DESTRUCTIVE HYDROGENATION OF BITUMINOUS MATERIALS UCH AS COAL, TAR, AND OIL. Pier, M.; Simon, W. (to Standard-I.G. Co.). US Patent 1,845,555. 16 Feb 1927.  
At 50 atm in presence of catalyst containing two constituents one comprising Ag, a mixture of Cu with Zn, or a mixture of Cu with Cd. COAL; COAL TAR; OILS; HYDROGENATION; CATALYSTS; SILVER; COPPER; ZINC; CADMIUM; ALUMINIUM; TITANIUM; VANADIUM; TANTALUM; MOLYBDENUM; CHROMIUM; TUNGSTEN; OXIDES
- 02158 DESTRUCTIVE HYDROGENATION OF BITUMINOUS MATERIALS SUCH AS COAL, TARS, OR OILS. Pier, M.; Simon, W. (to Standard-I.G. Co.). US Patent 1,845,439. 16 Feb 1927.  
Greater than 20 atm pressure and 450° temperature using Ru, Pt, Pd, or Ag deposited on support of MgO, magnesite, or Cr oxide as catalysts. COAL; COAL TAR; OILS; HYDROGENATION; MEDIUM PRESSURE; HIGH PRESSURE; HIGH TEMPERATURE; CATALYSTS; RUTHENIUM; PLATINUM; PALLADIUM; SILVER; MAGNESIUM OXIDES; CHROMIUM OXIDES; MAGNESIUM CARBONATES
- 02159 DESTRUCTIVE HYDROGENATION. Pier, M.; Simon, W. (to I. G. Farbenindustrie AG). German(FRG) Patent 489,279. 31 Jul 1927.  
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- 02160 DESTRUCTIVE HYDROGENATION OF CARBONACEOUS MATERIALS. Farbenind, I.G. British Patent 309228. 3 Oct 1927.  
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(300 to 1000 atm pressure). HIGH PRESSURE; CARBONACEOUS MATERIALS; HYDROGENATION
- 02162 DESTRUCTIVE HYDROGENATION OF COAL AND OTHER MATERIALS. Farbenind, I.G. British Patent 308,633. 21 Dec 1927.  
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- 02163 PART OF THE CATALYST IN THE PROCESSING OF COAL. Taylor, H.S. Proc. 2nd Int. Conf. Bit. Coal; 1: 190-199(1928).  
CATALYSTS; COAL; HYDROGENATION; POTASSIUM CARBONATES; ZINC OXIDES; TUNGSTEN OXIDES; CHROMIUM OXIDES; THORIUM OXIDES; ALUMINIUM OXIDES; SELENIUM OXIDES; TITANIUM OXIDES; ZIRCONIUM OXIDES; PLATINUM METALS; DISTILLATION
- 02164 DESTRUCTIVE HYDROGENATION. Gordon, K. (to Imperial Chemical Industries, Ltd.).  
British Patent 309,239. 14 Jan 1928.  
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- 02165 DESTRUCTIVE HYDROGENATION. van Peski, A.J. British Patent 315,780. 18 Jan 1928.  
460° and 50 atm pressure using carbide catalysts. COAL; BROWN COAL; HIGH TEMPERATURE; HYDROGENATION; MEDIUM PRESSURE; CARBIDES; NICKEL CARBIDES; CATALYSTS
- 02166 DESTRUCTIVE HYDROGENATION. Pott, A.; Broche, H. British Patent 309,446. 10 Apr 1928.  
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- 02167 DESTRUCTIVE HYDROGENATION. (to Bataafsche Petroleum Maatschappij). British Patent 309,859. 16 Apr 1928.  
Molybdenum and molybdenum compounds as first stage catalysts and iodine or iodine compounds as later stage catalysts. HYDROGENATION; MOLYBDENUM; MOLYBDENUM COMPOUNDS; CARBONACEOUS MATERIALS; GASEOUS PRODUCTS; LIQUID PRODUCTS; CATALYSTS; IODINE; IODINE COMPOUNDS
- 02168 DESTRUCTIVE HYDROGENATION. (to Holzverkohlungs-Industrie AG). British Patent 313,505. 12 Jun 1928.  
Presence of H<sub>2</sub>S and Mo, W, or their compounds. CARBONACEOUS MATERIALS; HYDROGENATION; HIGH TEMPERATURE; HIGH PRESSURE; MOLYBDENUM; MOLYBDENUM COMPOUNDS; TUNGSTEN; TUNGSTEN COMPOUNDS; HYDROGEN SULFIDES; BORIC ACID; CHROMIUM COMPOUNDS; HYDROCARBONS; SYNTHETIC FUELS; PRODUCTION
- 02169 DESTRUCTIVE HYDROGENATION. (to I. G. Farbenind. AG). British Patent 313,879. 18 Jun 1928.  
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- 02170 DESTRUCTIVE HYDROGENATION. (to N. V. de Bataafsche Petroleum Maatschappij). British Patent 314,859. 3 Jul 1928.  
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- 02171 DESTRUCTIVE HYDROGENATION. (to I. G. Farbenindustrie AG). British Patent 325,862. 28 Sep 1928.  
Method for avoiding choking of catalysts by high molecular weight carbon compounds. COAL; HYDROGENATION; CATALYSTS
- 02172 HYDROCARBONS OF LCW BOILING POINT FROM TARS, ETC. (to I. G. Farbenindustrie AG). British Patent 328,618. 13 Oct 1928.  
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- 02173 PURIFYING OILS. Farbenind, I.G. French Patent 662,387. 16 Oct 1928.  
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- 02175 SEPARATING UNSATURATED HYDROCARBONS FROM GAS MIXTURES. (to I. G. Farbenindustrie AG). British Patent 325,817. 26 Nov 1928.  
Washing with ketone. HYDROCARBONS; COAL; HYDROGENATION; WASHING; KETONES; ETHYLENE; SEPARATION PROCESSES
- 02176 DESTRUCTIVE HYDROGENATION. Tate, W.R.; Stephenson, H.P. (to Imperial Chemical Industries, Ltd.). British Patent 330,498. 8 Dec 1928.  
Iron oxide catalyst. COAL; HYDROGENATION; IRON OXIDES; CATALYSTS; HIGH PRESSURE
- 02177 DESTRUCTIVE HYDROGENATION. (to N.-V. de Bataafsche Petroleum Maatschappij). British Patent 330,223. 31 Dec 1928.  
Multistage catalyzed process using Mo or I as catalysts; production of liquid products. BROWN COAL; COAL; HYDROGENATION; MOLYBDENUM; IODINE; CATALYSTS; LIQUID PRODUCTS; GASEOUS PRODUCTS; HEATING
- 02178 INFLUENCE OF MINERAL CONSTITUENTS, PARTICULARLY IRON OXIDE, ON THE HYDROGENATION OF SOLID FUELS. Hlavica, B. Brennst.-Chem.; 10: 201-203(1929).  
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- 02179 SUBSTITUTES FOR GASOLINE. Ipat'ev, V. Chaleur Ind.; 112: 377-380(1929).  
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- 02180 PLASTICITY OF BERGINIZED COAL. Pertierra, J.M. An. Soc. Espan. Fis. Quim.; 27: 191-194(1929).  
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- 02181 CATALYTIC CLEAVAGE AND HYDROGENATION OF LOW-TEMPERATURE TARS. Tichy, J. Paliva Topeni; 11: 109-116; 125-133; 141-149(1929).  
Comparison of catalysts. COAL TAR; HYDROGENATION; CATALYSTS; TIN OXIDES; ALUMINIUM CHLORIDES; IRON OXIDES; ZINC CHLORIDES; NICKEL CHLORIDES; CRACKING; COBALT CHLORIDES; CADMIUM CHLORIDES; HYDROCARBONS; PRODUCTION; TUNGSTEN OXIDES; MOLYBDENUM OXIDES; CHROMIUM OXIDES; RADIUM
- 02182 EFFECT OF MINERAL CONSTITUENTS UPON THE HYDROGENATION OF SOLID FUELS. Hlavica, B. Paliva Topeni; 11: 150-152; 161-164(1929).  
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- 02183 TAR OILS. Fischer, E.J. Asphalt Teer; 29: 902-904; 1018-1021; 1396-1404(1929).  
Preparation, properties, and processing; solubility in 37 organic solvents. COAL TAR; REVIEWS; PRODUCTION; SOLUBILITY; DEHYDRATION; PURIFICATION; HYDROGENATION
- 02184 DESTRUCTIVE HYDROGENATION. (to I. G. Farbenindustrie AG). British Patent 328,992. 5 Jan 1929.  
Impregnation of carriers such as charcoal with catalysts such as ammonium molybdate; 400° and 200 atm. COAL TAR; CARBONACEOUS MATERIALS; AMMONIUM COMPOUNDS; CATALYSTS; HYDROGENATION; HIGH TEMPERATURE; HIGH PRESSURE
- 02185 DESTRUCTIVE HYDROGENATION. (to N.-V. Bataafsche Petroleum Maatschappij). British Patent 339,875. 11 Mar 1929.  
Coprecipitated Fe and Al oxides as catalysts. COAL; BROWN COAL; TAR; MINERAL OILS; HYDROGENATION; CATALYSTS; IRON OXIDES; ALUMINIUM OXIDES
- 02186 HYDROGENATING COAL, ETC. (to NV de Bataafsche Petroleum Maatschappij). French Patent 671,974. 23 Mar 1929.  
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- 02187 DESTRUCTIVE HYDROGENATION. Harrison, C.F.R. (to Imperial Chemical Industries, Ltd.). British Patent 331,817. 2 Apr 1929.  
Using Fe, Ni, Mo, Cr, Sn, or their compounds as catalysts. COAL; OILS; HYDROGENATION; CATALYSTS; ALUMINIUM; ZINC; ZINC COMPOUNDS; ALUMINIUM COMPOUNDS; IRON; IRON COMPOUNDS; NICKEL COMPOUNDS; NICKEL; MOLYBDENUM COMPOUNDS; MOLYBDENUM COMPOUNDS; CHROMIUM; CHROMIUM COMPOUNDS; TIN COMPOUNDS; TIN
- 02188 DESTRUCTIVE HYDROGENATION. (to I. G. Farbenindustrie AG). British Patent 331,916. 11 Apr 1929.  
Hydrogenation of middle oil fractionated from brown coal low temperature distillation tar at 450 to 470° and under 200 atm pressure. HYDROGENATION; BROWN COAL; COAL; DISTILLATION; HIGH PRESSURE; HIGH TEMPERATURE; ZINC OXIDES; GASEOUS PRODUCTS; WASHING; OILS; MOLYBDENUM COMPOUNDS; TAR
- 02189 DESTRUCTIVE HYDROGENATION. Harrison, C.F.R.; Strong, H.W. (to Imperial Chemical Industries, Ltd.). British Patent 332,246. 17 Apr 1929.  
Aqueous solution of the catalyst such as nickel nitrate or  $NH_4$  molybdate is sprayed over material. COAL; HYDROGENATION; AQUEOUS SOLUTIONS; CATALYSTS; NICKEL NITRATES; AMMONIUM COMPOUNDS; OILS; MOLYBDATES
- 02190 DESTRUCTIVE HYDROGENATION. (to I. G. Farbenindustrie AG). British Patent 332,336. 15 May 1929.  
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- 02191 ENRICHING CARBONACEOUS MATERIALS. Varga, J. French Patent 676,464. 10 Jun 1929.  
Elevated temperature and pressure in presence of  $H_2$  and Mo or W or their compounds. COAL; COAL TAR; MINERAL OILS; HYDROGENATION; MOLYBDENUM; TUNGSTEN; TUNGSTEN COMPOUNDS; MOLYBDENUM COMPOUNDS; HYDROGEN SULFIDES
- 02192 DESTRUCTIVE HYDROGENATION. Strong, H.W. (to Imperial Chemical Industries, Ltd.). British Patent 335,215. 19 Jun 1929.  
Metal catalysts for hydrogenation of oils or suspensions of coal in oils. HYDROGENATION; COAL; OILS; CATALYSTS; IRON; STEELS; TIN; NICKEL; TIN ALLOYS
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- 02194 CATALYST FOR USE IN DESTRUCTIVE HYDROGENATION OF CARBONACEOUS MATERIALS. Wietzel, R.; Willfroth, E. (to I. G. Farbenindustrie AG). US Patent 1,776,875. 30 Sep 1929.  
Use of Mg salt along with molybdic acid or ZnO. MAGNESIUM CHLORIDES; CATALYSTS; ZINC OXIDES; MOLYBDENUM COMPOUNDS; COAL; HYDROGENATION
- 02195 HYDROGENIZING COAL. (to N. V. de Bataafsche Petroleum Maatschappij). French Patent 684,718. 7 Nov 1929.  
FeO, Mo, or Mo compound catalyst. COAL; HYDROGENATION; MOLYBDENUM; MOLYBDENUM COMPOUNDS; IRON OXIDES
- 02196 DESTRUCTIVE HYDROGENATION OF CARBONACEOUS MATERIALS SUCH AS COAL. Waterman, H.I. (to N.-V. de Bataafsche Petroleum Maatschappij). US Patent 1,829,759. 10 Nov 1929.  
Catalyst of alkaline Fe oxide-containing mass obtained from the conversion of bauxite to Al oxide. COAL; HYDROGENATION; IRON OXIDES; ALUMINIUM OXIDES; CATALYSTS
- 02197 DESTRUCTIVE HYDROGENATION. (to Imperial Chemical Industries, Ltd.). German (FRG) Patent 545,499. 19 Nov 1929.  
At 250 to 700°C and 100 to 500 atm pressure in presence of Mo catalyst and H<sub>2</sub>S. OILS; COAL; HYDROGENATION; MOLYBDENUM; CATALYSTS; HYDROGEN SULFIDES; HIGH TEMPERATURE; HIGH PRESSURE
- 02198 DESTRUCTIVE HYDROGENATION OF MATERIALS SUCH AS COAL, TAR, OR OIL. Pier, M. (to Standard-I. G. Co.). US Patent 1,890,438. 6 Dec 1929.  
Hydrogenation of coal, tar, or oil at 300 to 700° at 20 atm pressure in presence of Mo or Zn catalyst. COAL; COAL TAR; OILS; HYDROGENATION; HIGH TEMPERATURE; MEDIUM PRESSURE; MOLYBDENUM; ZINC; CATALYSTS; GASEOUS PRODUCTS; CHROMIUM; ALUMINIUM
- 02199 DESTRUCTIVE HYDROGENATION. (to N.-V. de Bataafsche Petroleum Maatschappij). British Patent 346,689. 6 Dec 1929.  
Catalysts of Cr, W, U, Mn, Co, Ni, or Fe, their compounds or mixtures, in colloidal form. COAL; LIGNITE; CELLULOSE; HYDROGENATION; CARBON MONOXIDE; CHEMICAL REACTIONS; COLLOIDS; CATALYSTS; CHROMIUM; TUNGSTEN; URANIUM; MANGANESE; COBALT; NICKEL; IRON; MIXTURES; CHROMIUM COMPOUNDS; TUNGSTEN COMPOUNDS; URANIUM COMPOUNDS; MANGANESE COMPOUNDS; COBALT COMPOUNDS; NICKEL COMPOUNDS; IRON COMPOUNDS; WATER VAPOR
- 02200 DESTRUCTIVE HYDROGENATION. Strong, H.W. (to Imperial Chemical Industries, Ltd.). British Patent 345,305. 20 Dec 1929.  
Vapor-phase destructive hydrogenation of middle oil using Co-Sn, Ni-Sn, Ni-Fe-Sn, Ni-Co-Sn, or Fe-Co-Sn alloy catalysts. POWDERS; CATALYSTS; COAL; HYDROGENATION; COBALT ALLOYS; TIN ALLOYS; NICKEL ALLOYS; IRON ALLOYS; OILS
- 02201 HIGH-PRESSURE HYDROGENATION OF NEUTRAL AND PHENOLIC OIL IN LOW-TEMPERATURE TAR. Tashiro, S.; Ando, S. Nenryo Kyokai-shi; 9: 1206-14(1930).  
OILS; HYDROGENATION; PHENOLS; TAR; CATALYSTS; NICKEL; IRON; CHEMICAL REACTIONS
- 02202 DEVELOPMENT OF HYDROGENATION OF COAL. Hankiss, S. Tuzelestech; 2: 17-22(1930).  
Reviv. HYDROGENATION; COAL; REVIEWS
- 02203 PRODUCTION OF HYDROCARBONS FROM PHENOLIC TARS. Padovani, C.; de Bartholomaeis, E. Atti III Congresso Naz. Chim. Pura Applicata; 767-77(1930).  
PHENOLS; TAR; HYDROCARBONS; PRODUCTION; HIGH TEMPERATURE; BENZENE; HYDROGENATION
- 02204 HYDROGENATION OF FUELS. Levi, M.G.; Padovani, C.; Mariotti, A. Ann. Chim. Appl.; 20: 361-404(1930).  
Outline of Bergius process; catalytic properties of Fe<sub>2</sub>O<sub>3</sub> and Ni<sub>2</sub>O<sub>3</sub> in hydrogenation reaction. BERGIUS PROCESS; HYDROGENATION; COAL; IRON OXIDES; NICKEL OXIDES; CATALYSTS
- 02205 HYDROGENATION AT HIGH PRESSURES. Roberti, G. Mem. accad. Italia (Classe Sci. Fis. Mat. e Nat.); 1: No. 2, 15p.(1930).  
Hydrogenation of phenolic distillate from lignite at high pressure using Co<sub>2</sub>S<sub>3</sub>. HYDROGENATION; LIGNITE; PHENOLS; COBALT SULFIDES; CATALYSTS; CYCLOHEXANE; HIGH PRESSURE
- 02206 DISTRIBUTION OF CARBON, HYDROGEN, NITROGEN, SULFUR, AND OXYGEN IN THE HYDROGENATION PRODUCTS OF AN EOCENE BROWN COAL. von Makray, I. Brennst.-Chem.; 11: 151-152; 172-174(1930).  
110 atm and 470° in presence of Fe<sub>2</sub>O<sub>3</sub>. CARBON; HYDROGEN; NITROGEN; SULFUR; OXYGEN; DISTRIBUTION; HYDROGENATION; BROWN COAL; COAL; IRON OXIDES
- 02207 LOW-TEMPERATURE TARS: RECENT WORK ON THEIR CONSTITUENTS. Morgan, G.T. Chem. Trade J.; 87: 253-254(1930).  
COAL TAR; CHEMICAL COMPOSITION; BITUMINOUS COAL; SOLVENTS; SOLVENT EXTRACTION; CATALYSTS; MOLYBDENUM OXIDES; HYDROGENATION
- 02208 CATALYTIC HYDROGENATION OF PITCH AND BLACK COAL AND THEIR PRODUCTS OF DISTILLATION. Hlavica, B.; Trca, E. Chem. Obzor; 5: 121-124; 153-159(1930).  
Effects of catalysts on yields of tars, oils, and gasoline. COAL; HYDROGENATION; DISTILLATION; BLACK COAL; PITCHES; COAL TAR; CATALYSTS; NICKEL SULFIDES; NICKEL CHLORIDES; COPPER CHLORIDES; ZINC CHLORIDES; OILS; IRON OXIDES; CATALYSIS; PHENOLS; GASOLINE; AMMONIUM COMPOUNDS; MOLYBDATES
- 02209 HYDROGENATION OF SOUTH AFRICAN COAL. Lategan, P.N. 3rd (Triennial) Empire Met. Congress, S. Afr.; 1-21(1930).  
Suspension of coal in liquid medium and addition of Fe<sub>2</sub>O<sub>3</sub>. COAL; HYDROGENATION; SOUTH AFRICA; IRON OXIDES; CATALYSTS
- 02210 DESTRUCTIVE HYDROGENATION OF CARBONACEOUS SUBSTANCES. Varga, J. (to Deutsche Gold- und Silber-Scheideanstalt vorm. Roessler). US Patent 1,894,926. 17 Jan 1930.  
250 to 700° and 100 to 500 atm pressure; W catalysts. HYDROGENATION; CARBONACEOUS MATERIALS; MEDIUM TEMPERATURE; HIGH TEMPERATURE; HIGH PRESSURE; COAL; COAL TAR; OILS; TUNGSTEN; CATALYSTS; HYDROGEN SULFIDES
- 02211 DESTRUCTIVE HYDROGENATION CATALYSTS. Griffith, R.H. (to Gas Light and Coke Co.). British Patent 349,991. 25 Jan 1930.  
Optimum atomic proportion of promoters for use with Mo catalyst. PROMOTERS; CATALYSTS; SILICON; BORON; PHOSPHORUS; LITHIUM; CALCIUM; MOLYBDENUM; CHEMICAL PREPARATION; COAL; HYDROGENATION
- 02212 DESTRUCTIVE HYDROGENATION. (to I. G. Farbenind.). British Patent 348,690. 15 Feb 1930.  
At 250°C or higher, 20 atm. or more using catalysts formed by treating metals of groups 2 and 6 with volatile S or S compounds. COAL; HYDROGENATION; CATALYSTS; HIGH TEMPERATURE; MEDIUM PRESSURE; HIGH PRESSURE; CHEMICAL PREPARATION; GASES; HYDROGEN SULFIDES; CARBON SULFIDES; TELLURIDES; SELENIDES; ETHERS; ORGANIC SULFUR COMPOUNDS; LEAD OXIDES; BISMUTH OXIDES; COPPER OXIDES; ANTIMONY OXIDES; TIN OXIDES; CHROMIUM

- OXIDES; MOLYBDENUM OXIDES; CHEMICAL REACTIONS
- 02213 DESTRUCTIVE HYDROGENATION OF COAL AND OTHER CARBONACEOUS MATERIALS. (to N.-V. de Bataafsche Petroleum Maatschappij). British Patent 348,243. 20 Feb 1930.  
Using catalyst produced by treating metal oxides (such as Fe and Co) with H<sub>2</sub>S. CARBONACEOUS MATERIALS; COAL; ASPHALTS; COAL TAR; PHENOLS; HIGH TEMPERATURE; HIGH PRESSURE; PATENTS; HYDROGENATION; IRON OXIDES; COBALT OXIDES; CHEMICAL REACTIONS; HYDROGEN SULFIDES
- 02214 DESTRUCTIVE HYDROGENATION. Maruhn, J.; Tuebben, L. US Patent 1,850,022. 15 Mar 1930.  
Production of low b. p. hydrocarbons by heating of carbonaceous materials at high pressure (1000 atm) with H-containing gas. COAL; HYDROGENATION; OILS; HIGH PRESSURE; HYDROCARBONS; LIQUID PRODUCTS; HIGH TEMPERATURE
- 02215 HYDROGENATING CARBONACEOUS MATERIALS SUCH AS LIGNITE OR COAL. Kern, L. US Patent 1,852,709. 5 Apr 1930.  
Mixing with clay and hydrogenating agent. LIGNITE; COAL; HYDROGENATION; CLAYS; MAGNESIUM CHLORIDES; CONFIGURATION; PLASTICITY
- 02216 CONVERSION OF SOLID AND LIQUID FUELS, ETC., INTO MORE VALUABLE LIQUID PRODUCTS. Krauch, C.; Pier, M. (to Standard-I. G. Co.). US Patent 1,904,476. 18 Apr 1930.  
300 to 5000; 20 atm pressure. COAL; OILS; HYDROGENATION; HIGH TEMPERATURE; MEDIUM PRESSURE; ALUMINIUM BASE ALLOYS; MANGANESE ALLOYS; MAGNESIUM ALLOYS; COPPER ALLOYS; LIQUID PRODUCTS; SYNTHETIC FUELS
- 02217 DESTRUCTIVE HYDROGENATION. (to N.-V. de Bataafsche Petroleum Maatschappij). British Patent 353,506. 25 Apr 1930.  
Using catalysts such as Mo oxide, Cr, Al, and Fe hydroxides in colloidal state on carriers. HYDROGENATION; CARBONACEOUS MATERIALS; CATALYSTS; MOLYBDENUM OXIDES; CHROMIUM HYDROXIDES; ALUMINIUM HYDROXIDES; IRON HYDROXIDES; COLLOIDS
- 02218 DESTRUCTIVE HYDROGENATION. Jennings, J.M. (to Standard-I. G. Co.). British Patent 365,892. 25 Jun 1930.  
Production of hydrocarbon oils by hydrogenation of carbonaceous materials in oil suspension in presence of Cr, W, or Mo oxide catalyst. HYDROGENATION; CATALYSTS; OILS; HYDROCARBONS; MEDIUM PRESSURE; CHROMIUM OXIDES; TUNGSTEN OXIDES; MOLYBDENUM OXIDES; ZINC OXIDES; ALUMINIUM OXIDES; MAGNESIUM OXIDES; CARBONACEOUS MATERIALS; PRODUCTION
- 02219 HYDROGENATING COAL, ETC. (to I. G. Farbenind.). French Patent 38,949. 20 Aug 1930.  
Catalysts produced by action of volatile S compounds on metals or their compounds. COAL; HYDROGENATION; COAL TAR; OILS; CATALYSTS; SULFUR COMPOUNDS; METALS; CHEMICAL REACTIONS; CHEMICAL PREPARATION
- 02220 DESTRUCTIVE HYDROGENATION OF CARBONACEOUS MATERIALS. (to N. V. de Bataafsche Petroleum Maatschappij). British Patent 362,354. 25 Aug 1930.  
Catalyst containing Re in colloidal form. COAL; LIGNITE; CELLULOSE; TAR; RHENIUM; RHENIUM COMPOUNDS; CATALYSTS; COLLOIDS; HYDROGENATION
- 02221 LOW-BOILING LIQUIDS BY DESTRUCTIVE HYDROGENATION. Krauch, C.; Pier, M. (to Standard-I. G. Co.). US Patent 1,876,009. 6 Sep 1930.  
200 atm pressure, 300 to 7000; solid Ag or Cu compound as catalyst. HYDROGENATION; COAL TAR; BROWN COAL; OILS; HIGH TEMPERATURE; MEDIUM
- PRESSURE; SILVER NITRATES; COPPER HYDROXIDES; SYNTHETIC FUELS; PRODUCTION
- 02222 PURIFYING HYDROGENATION PRODUCTS OF CARBONACEOUS MATERIALS. Krauch, C.; Pier, M.; Eisenhut, A. (to Standard-I.-G. Co.). US Patent 1,822,351. 8 Sep 1930.  
HYDROGENATION; PURIFICATION; COAL; BROWN COAL
- 02223 SEPARATING OILS FROM RESIDUES FROM DESTRUCTIVE HYDROGENATION OF COAL. Krauch, K.; Pier, M.; Hochschwender, E. (to I. G. Farbenindustrie AG). US Patent 1,881,691. 11 Oct 1930.  
Addition of alkyl naphthalenesulfonate and centrifugation. OILS; SEPARATION PROCESSES; HYDROGENATION; COAL; SULFONIC ACID ESTERS
- 02224 HYDROGENATING COAL, ETC. Pott, A.; Broche, H. US Patent 1,881,927. 11 Oct 1930.  
Extraction by tetralin and hydrogenated at pressure above 20 atm and 300°. COAL; HYDROGENATION; TETRALIN; SOLVENT EXTRACTION; MEDIUM PRESSURE; HIGH TEMPERATURE
- 02225 HYDROGENATING COAL, ETC. (to N.-V. de Bataafsche Petroleum Maatschappij). French Patent 307,210. 6 Dec 1930.  
Catalyst of Cr, W, U, Mn, Co, Ni, or Fe or their compounds in colloidal form. COAL; HYDROGENATION; CHROMIUM; TUNGSTEN; MANGANESE; COBALT; NICKEL; IRON; CATALYSTS; CHROMIUM COMPOUNDS; TUNGSTEN COMPOUNDS; MANGANESE COMPOUNDS; COBALT COMPOUNDS; NICKEL COMPOUNDS; IRON COMPOUNDS
- 02226 HYDROGENATION OF COAL TAR PRODUCED BY LOW-TEMPERATURE CARBONIZATION. Orlov, E.I.; Prokopetz, E.I.; Eru, I.I. Khim. Tverd. Topl.; 2: No. 1, 6-16(1931).  
Hydrogenation at 450 to 460° at 44 to 220 atm using catalysts of ammonium, Zn, Mo, V, W, U, Cr, Mn, Co, and Au compounds. TAR; HYDROGENATION; CATALYSTS; ZINC COMPOUNDS; MOLYBDENUM OXIDES; AMMONIUM COMPOUNDS; VANADIUM; TUNGSTEN OXIDES; URANIUM OXIDES; CHROMIUM OXIDES; MANGANESE OXIDES; COBALT OXIDES; SILVER OXIDES; MEDIUM PRESSURE; HIGH PRESSURE; LIQUID PRODUCTS
- 02227 HYDROGENATION OF SOLID FUELS. Zerbe, C. Chem. Ztg.; 55: 4, 18-9, 38-40, 94-6, 114-7, 136-7, 152-3(1931).  
HYDROGENATION; COAL; REVIEWS
- 02228 CATALYTIC HYDROGENATION OF SECONDARY GASOLINE OF BROWN-COAL TAR. Varga, J. Math. Natur. Anz. Ungar. Akad. Wiss.; 48: 809-815(1931).  
HYDROGENATION; CATALYSTS; GASOLINE; COAL TAR; BROWN COAL; CRACKING; MEDIUM PRESSURE; MOLYBDENUM OXIDES
- 02229 HYDROGENATION OF A FEW DERIVATIVES OF COAL TAR (1) IN THE PRESENCE OF SODIUM HYDRIDE AS CATALYST, (2) UNDER HIGH PRESSURE AND HIGH TEMPERATURE. Hugel, G.; Friess, J. Ann. Combustibles Liquides; 6: 1109-47(1931).  
COAL TAR; HYDROGENATION; SODIUM HYDRIDES; CATALYSTS; HIGH TEMPERATURE; CRACKING; HIGH PRESSURE
- 02230 TESTS ON THE HYDROGENATION, DISTILLATION AND COMBUSTION OF CHILEAN COALS. Muller, W. Bol. Miner. Soc. Nacl. Mineraria; 43: 201-5, 343-51, 505-12(1931).  
COAL; HYDROGENATION; DISTILLATION; COMBUSTION
- 02231 HYDROGENATION OF MOSCOW BROWN-COAL TAR UNDER HIGH PRESSURE. Klyukvin, N.A.; Polozov, V.F. Khim. Tverd. Topl.; 2: No. 10, 33-61(1931).  
At 395-410° and 200 atm pressure, Fe powders as catalyst. BROWN COAL; COAL TAR; HYDROGENATION; HIGH TEMPERATURE; HIGH PRESSURE; CATALYSTS; IRON;



- POWDERS; PRODUCTION; OILS
- 02232 METHODS OF HYDROGENATION. Friess, J. Ann. Combustibles Liquides; 6: 981-94(1931). COAL; HYDROGENATION; REVIEWS; REACTION KINETICS
- 02233 PRESSURE HYDROGENATION WITH IODINE AS CATALYST. Varga, J.; Almasi, L. Brennst.-Chem.; 12: 327-9(1931). HYDROGENATION; IODINE; CATALYSTS; PHENOLS; OILS; COAL; TAR; HIGH PRESSURE
- 02234 DESTRUCTIVE HYDROGENATION OF SOLID CARBONACEOUS MATERIALS. Harrison, C.F.R.; Strong, H.W. (to Imperial Chemical Industries Ltd.). US Patent 1,919,108. 18 Jul 1931. Aqueous solution of Ni nitrate or  $\text{NH}_4$  molybdate. CARBONACEOUS MATERIALS; HYDROGENATION; AQUEOUS SOLUTIONS; NICKEL NITRATES; AMMONIUM COMPOUNDS; MOLYBDATES; OILS
- 02235 HYDROGENATION OF LOW-TEMPERATURE TAR PRODUCTS. Morgan, G.T.; Veryard, J.T. J. Soc. Chem. Ind.; 51: 80T-82T(1932). Effects of vanadic acid, molybdic acid, molybdic sulfide as catalysts at 320 to 360° and 100 atm pressure. TAR; HYDROGENATION; MOLYBDENUM SULFIDES; MEDIUM PRESSURE; OILS; CATALYSTS
- 02236 ACTION OF CATALYSTS IN THE HIGH-PRESSURE HYDROGENATION OF PHENOLS AND HYDROCARBONS. Tropsch, H.; Weinstein, O. Mitt. Kohlenforschunginst. Prag.; No. 4, 171-197(1932).  $\text{WS}_3$ ,  $\text{MoO}_3$ ,  $\text{MoS}_3$ ,  $\text{CoS}$ , and  $\text{ZnS}$  as catalysts. PHENOLS; HYDROCARBONS; HYDROGENATION; CATALYSTS; CRESOLS; TUNGSTEN SULFIDES; MOLYBDENUM SULFIDES; COBALT SULFIDES; MOLYBDENUM OXIDES; NICKEL SULFIDES; ZINC SULFIDES; ALKANES; OILS
- 02237 ROLE OF CATALYSTS IN HYDROGENATION CRACKING. Kling, A.; Florentin, D. Proc. 3rd Intern. Conf. Bituminous coal; 2: 28-34(1932). CATALYSTS; HYDROGENATION; CRACKING; MOLYBDENUM OXIDES; NICKEL HYDROXIDES; PHENOLS; COAL
- 02238 SOME ASPECTS OF FUEL RESEARCH. Sinnatt, F.S. Proc. 3rd Intern. Conf. Bituminous Coal; 1: 631-51(1932). Tin and zinc compounds as catalyst in hydrogenation of coal. LIQUID PRODUCTS; HYDROGENATION; CATALYSTS; COAL; TIN OXIDES; ZINC OXIDES; TIN COMPOUNDS; ZINC COMPOUNDS; CARBOXYLIC ACID SALTS; TAR; HIGH TEMPERATURE; HIGH PRESSURE; AMMONIUM COMPOUNDS; MOLYBDATES; SULFUR
- 02239 HYDROGENATION OF FUSHUN COAL. Ogawa, T. J. Fuel Soc. Japan; 11: 1635-1646(1932). 420 to 480° and 200 to 300 atm pressure. COAL; HYDROGENATION; TAR; IRON OXIDES; CATALYSTS; HIGH TEMPERATURE; HIGH PRESSURE
- 02240 STATUS OF HYDROGENATION OF PETROLEUM, BITUMEN, COAL TAR, AND COAL. Warren, T.E. Can. Dept. Mines, Mines Branch, Memorandum Series; No. 52, 11p.(1932). Bibliography. COAL; COAL TAR; PETROLEUM; HYDROGENATION; BIBLIOGRAPHIES; BITUMENS
- 02241 PRODUCTION OF GASOLINE BY HYDROGENATION OF COAL. Taylor, N. Soc. Chem. Ind. Victoria, Proc.; 32: 740-764(1932). At 450° and above 200 atm pressure; reactions using both low temperature and high temperature catalysts in vapor-phase hydrogenation. COAL; HYDROGENATION; HIGH TEMPERATURE; HIGH PRESSURE; CATALYSTS; OILS; GASOLINE; PRODUCTION
- 02242 HYDROGENATION OF AMERICAN COALS. Beuschlein, W.L.; Christensen, B.E.; Wright, C.C. Ind. Eng. Chem.; 24: 747-50(1932). 5000 psi using phenol as dispersion medium. COAL; HYDROGENATION; HIGH PRESSURE; PHENOL; CHLOROFORM
- 02243 MOTOR SPIRIT FROM HYDROGENATION OF TAR. King, J.G.; Matthews, M.A. Gas Eng.; 49: 593-597(1932). 200 atm pressure and 450° using ammonium molybdate as catalyst. SYNTHETIC FUELS; COAL TAR; HYDROGENATION; CRACKING; HIGH PRESSURE; HIGH TEMPERATURE; CATALYSTS; AMMONIUM COMPOUNDS; MOLYBDATES; ACTIVATED CARBON; PRODUCTION
- 02244 HYDROGENATION: SOUTH AFRICA AND THE LUENA WORKS. Sommerkorn, W. J. Chem. Met. Mining Soc. S. Africa; 32: 155-74(1932). IG PROCESS; HYDROGENATION; CATALYSTS; COAL; SOUTH AFRICA
- 02245 THERMAL REACTION AND THE HYDROGENATION OF COAL. I. THE THERMAL REACTION OF FUSHUN COAL AT HIGH PRESSURE IN A NITROGEN ATMOSPHERE. Abe, R. J. Soc. Chem. Ind. Japan; 35: No. Suppl., 503-505(1932). COAL; HYDROGENATION; CHEMICAL REACTIONS; HIGH PRESSURE; NITROGEN; IRON OXIDES; CATALYSTS
- 02246 CATALYSTS SUITABLE FOR USE IN DESTRUCTIVE HYDROGENATION OF CARBONACEOUS MATERIALS. Pier, M.; Winkler, K. (to Standard-I.G. Co.). US Patent 1,946,109. 6 Feb 1932. Production of S-immune catalysts by mixing Fe, Ni, or Co or their alloys or carbides with a paste of molybdic acid,  $\text{ZnO}$ , or  $\text{MgO}$  and drying. CARBONACEOUS MATERIALS; HYDROGENATION; CATALYSTS; IRON; NICKEL; COBALT; COBALT ALLOYS; COBALT CARBIDES; IRON ALLOYS; IRON CARBIDES; NICKEL ALLOYS; NICKEL CARBIDES; MOLYBDENUM COMPOUNDS; ZINC OXIDES; MAGNESIUM OXIDES; MIXTURES; CHEMICAL PREPARATION
- 02247 CATALYSTS SUITABLE FOR USE IN DESTRUCTIVE HYDROGENATION OF CARBONACEOUS MATERIALS. Pier, M.; Winkler, K. (to Standard-I.G. Co.). US Patent 1,946,108. 6 Feb 1932. Incorporation of aluminium powder with an aqueous paste of molybdic acid and  $\text{ZnO}$ . CARBONACEOUS MATERIALS; HYDROGENATION; CATALYSTS; ALUMINIUM; POWDERS; MOLYBDENUM COMPOUNDS; ZINC OXIDES; MIXTURES; CHEMICAL PREPARATION
- 02248 DESTRUCTIVE HYDROGENATION OF CARBONACEOUS MATERIALS. von Szeszich, L. US Patent 1,948,058. 20 Feb 1932. At high temperature and high pressure in the presence of  $\text{H}_2\text{S}$  using Mo or W as catalyst. COAL; BROWN COAL; COAL TAR; HYDROGENATION; HIGH TEMPERATURE; HIGH PRESSURE; HYDROGEN SULFIDES; CATALYSTS; MOLYBDENUM; TUNGSTEN
- 02249 DESTRUCTIVE HYDROGENATION. Krauch, C.; Pier, M.; Simon, W. (to Standard-I. G. Co.). US Patent 1,922,542. 15 Aug 1932. 400 to 700°, Al, Si, Cu--Fe, porous carbon, silica, hydrosilicates, alumina and magnesia catalysts. HYDROGENATION; COAL; TAR; OILS; HIGH TEMPERATURE; ALUMINIUM; SILICON; COPPER ALLOYS; IRON ALLOYS; CARBON; SILICON OXIDES; ALUMINIUM OXIDES; MAGNESIUM OXIDES; MEDIUM PRESSURE; COBALT; TUNGSTEN; MOLYBDENUM; MOLYBDENUM COMPOUNDS; TUNGSTEN COMPOUNDS; COBALT COMPOUNDS
- 02250 DESTRUCTIVE HYDROGENATION. Pier, M.; Simon, W. (to Standard-I. G. Co.). US Patent 1,922,499. 15 Aug 1932. Catalysts containing 3 constituents: Zn or Mg oxide or Zn sulfide; oxides and sulfides of Ni and Co; oxides of V and metals of 6th group. HYDROGENATION; COAL; TAR; OILS; ZINC OXIDES; MAGNESIUM OXIDES; ZINC SULFIDES; NICKEL OXIDES; COBALT OXIDES; COBALT SULFIDES; NICKEL SULFIDES; VANADIUM OXIDES; OXIDES

- 02251 DESTRUCTIVE HYDROGENATION OF CARBONACEOUS MATERIALS TO FORM LIQUID PRODUCTS. Krauch, C.; Pier, M. (to Standard-I. G. Co.). US Patent 1,923,576. 22 Aug 1932.  
Solid catalyst containing multivalent metal and S (Co sulfide); 20 atm pressure. COAL; SULFUR; METALS; COBALT SULFIDES; MEDIUM PRESSURE; HYDROGENATION; LIQUID PRODUCTS
- 02252 DESTRUCTIVE HYDROGENATION OF CARBONACEOUS MATERIALS. Waterman, H.I. (to N.-V. de Bataafsche Petroleum Maatschappi). US Patent 1,929,528. 10 Oct 1932.  
Catalyzed by a mixture containing Mo and an activated mass derived from an alkaline Fe oxide-containing material obtained from the conversion of bauxite to Al oxide by wet treatment. COAL; BROWN COAL; HYDROGENATION; CATALYSTS; MOLYBDENUM; IRON OXIDES; ALUMINIUM; ORES; ALUMINIUM OXIDES
- 02253 DESTRUCTIVE HYDROGENATION OF MATERIALS SUCH AS BROWN COAL, TAR, OR OIL RESIDUES. Krauch, C.; Pier, M. (to Standard-I. G. Co.). US Patent 1,931,549. 24 Oct 1932.  
At about 500° and at least 20 atm pressure using ammonia as a catalyst. COAL; TAR; OILS; HYDROGENATION; HIGH TEMPERATURE; MEDIUM PRESSURE; CATALYSTS; AMMONIA
- 02254 DESTRUCTIVE HYDROGENATION OF MATERIALS SUCH AS BROWN COAL, TAR, OR OIL RESIDUES. Krauch, C.; Pier, M. (to Standard-I. G. Co.). US Patent 1,931,550. 24 Oct 1932.  
At 300—700° and at least 20 atm pressure using nitrides of Cr, Mn, Si, Ti, or V as catalysts. COAL; TAR; OILS; HYDROGENATION; HIGH TEMPERATURE; MEDIUM PRESSURE; CATALYSTS; CHROMIUM NITRIDES; MANGANESE NITRIDES; SILICON NITRIDES; TITANIUM NITRIDES; VANADIUM NITRIDES
- 02255 CATALYTIC DESTRUCTIVE HYDROGENATION OF HEAVY HYDROCARBONS. Peck, E.B. (to Standard-I. G. Co.). US Patent 1,933,508. 31 Oct 1932.  
Using oxides and sulfides of metals from groups 2 or 6 of the periodic table. COAL; COAL TAR; HYDROGENATION; OXIDES; SULFIDES; METALS; CATALYSTS
- 02256 DESTRUCTIVE HYDROGENATION OF BITUMINOUS MATERIALS. Pier, M.; Winkler, K. (to Standard-I. G. Co.). US Patent 1,932,673. 31 Oct 1932.  
Using solid, finely divided catalyst of tungstic acid, molybdic acid, and ZnO. COAL; OILS; COAL TAR; HYDROGENATION; TUNGSTEN; MOLYBDENUM; ZINC OXIDES; SOLIDS; CATALYSTS
- 02257 DESTRUCTIVE HYDROGENATION OF TARS, MINERAL OILS, ETC. Pier, M.; Simon, W. (to Standard-I. G. Co.). US Patent 1,938,542. 5 Dec 1932.  
Using a catalyst comprising active C and an O compound of P or As. COAL TAR; MINERAL OILS; HYDROGENATION; MEDIUM PRESSURE; CATALYSTS; ACTIVATED CARBON; OXYGEN COMPOUNDS; PHOSPHORUS COMPOUNDS; ARSENIC COMPOUNDS
- 02258 HYDROGENATED PRODUCTS OF PHENOLIC OIL IN LOW-TEMPERATURE TAR. I AND II. Ando, S. J. Soc. Chem. Ind., Japan; 36: No. Suppl., 86-90(1933).  
250° and 100 atm of H<sub>2</sub> in presence of Ni<sub>2</sub>O<sub>3</sub> catalyst. BITUMINOUS COAL; CARBONIZATION; HYDROGENATION; OILS; COAL TAR; NICKEL OXIDES; PRODUCTION; CATALYSTS; CYCLOALKANES
- 02259 HIGH-PRESSURE EXPERIMENTAL PLANT. Ormandy, W.R.; Burns, J. World Petroleum Congr., London; 295-301(1933).  
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- 02266 HYDROGENATION OF COAL AND OIL. Rogers, L.J. J. Council Sci. Ind. Res.; 6: 105-108(1933).  
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- 02271 HYDROGENATION AND SYNTHESIS. Pier, M. OI u. Kohle; 1: 47-53(1933).  
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- 02272 REPORT OF EXPERIMENTAL WORK ON THE HYDROGENATION OF CANADIAN COAL, COAL TAR, AND BITUMEN FOR THE PRODUCTION OF MOTOR FUEL. I. BATCH EXPERIMENTS ON THE HYDROGENATION AND CRACKING OF LOW-TEMPERATURE COAL TAR. Warren, T.E.; Williams, A.R. Can. Dept. Mines; 1-10(1933).  
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- 02292 DESTRUCTIVE HYDROGENATION. (to I. G. Farbenindustrie AG). French Patent 746,496. 29 May 1933.  
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- 02297 HYDROGENATING TAR, ETC. Pier, M.; Winkler, K. (to I. G. Farbenindustrie AG). German (FRG) Patent 581,941. 5 Aug 1933.  
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- 02301 CATALYTIC MATERIAL SUITABLE FOR HYDROGENATING COAL, OIL, ETC. Bindley, Wm. T.R. (to Robinson Bindley Processes Ltd.). US Patent 1,979,187. 30 Oct 1933.  
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- 02302 DESTRUCTIVE HYDROGENATION. (to The Gas Light and Coke Co.). French Patent 754,675. 10 Nov 1933.  
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- 02303 HYDROGENATING CARBONACEOUS MATERIALS. (to International Hydrogenation Patents Co., Ltd.). British Patent 403,481. 28 Dec 1933.  
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- 02317 PROPANE AND BUTANE. Ludwig, W. Glueckauf; 70: 709-16(1934).  
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- 02318 HYDROGENATION OF COAL AND OF PRIMARY TARS. Berthelot, C. Chimie and industrie; 31: 522-36(1934).  
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- 02348 DESTRUCTIVE HYDROGENATION OF VARIOUS CARBONACEOUS MATERIALS SUCH AS TAR, OILS, COAL, ETC. Krauch, C.; Pier, M. (to Standard-I.G. Co.). US Patent 1,994,075. 12 Mar 1934.  
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- 02351 DESTRUCTIVE HYDROGENATION OF CARBONACEOUS MATERIALS SUCH AS COAL, LIGNITE, PEAT, WOOD, OILS, OR BITUMENS. Krauch, C.; Pier, M. (to Standard-I.G. Co.). US Patent 1,996,009. 26 Mar 1934.  
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 $\text{NH}_3$  thiomolybdate as catalyst. HYDROGENATION; COAL TAR; EQUIPMENT; BITUMINOUS COAL; CATALYSTS; AMMONIUM COMPOUNDS; SULFUR COMPOUNDS; MOLYBDENUM COMPOUNDS
- 02446 THE TECHNIC OF HYDROGENATION OF COAL AND ITS PRODUCTS. King, J.G. *Colliery Guardian*; 152: 1106-8, 1153-4, 1196-7(1936).  
Pressure of 200 to 250 atm; temperature of 400 to 480; hydrogen concentration of at least 80 percent in spent gases. COAL; HYDROGENATION; CATALYSTS
- 02447 HYDROGENATION OF COAL AND OF LOW-TEMPERATURE CARBONIZATION TAR. Berthelot, C. *15me Congr. chim. ind.*; 817-22(1936).  
Bergius process. COAL; COAL TAR; HYDROGENATION; CARBONIZATION; BERGIUS PROCESS
- 02448 DESTRUCTIVE HYDROGENATION. (to Compagnie des Mines de Vicoigne). French Patent 792,771. 10 Jan 1936.  
Use of sodium or potassium compounds containing Al, Fe, or Sn as catalyst; below 100 kg pressure and 420°. HYDROGENATION; COAL; LIGNITE; PEAT; WOOD; CATALYSTS; SODIUM COMPOUNDS; POTASSIUM COMPOUNDS; ALUMINIUM; IRON; TIN
- 02449 DESTRUCTIVE HYDROGENATION. (to International Hydrogenation Patents Co. Ltd.). French Patent 793,108. 16 Jan 1936.  
Impregnation with aqueous solutions of soluble compounds of Fe or Co, e.g.,  $\text{FeCl}_2$ ,  $\text{FeSO}_4$ , or Co nitrate. HYDROGENATION; LIGNITE; CARBONACEOUS MATERIALS; CATALYSTS; HIGH TEMPERATURE; IRON CHLORIDES; IRON SULFATES; COBALT NITRATES; COAL
- 02450 CATALYSTS FOR DESTRUCTIVE HYDROGENATION. French Patent 793,436. 24 Jan 1936.  
Sulfides of Mo or W. HYDROGENATION; CATALYSTS; MOLYBDENUM SULFIDES; TUNGSTEN SULFIDES; PRODUCTION; CHEMICAL PREPARATION; COAL
- 02451 DESTRUCTIVE HYDROGENATION. French Patent 793,464. 25 Jan 1936.  
Use of lead or lead compounds as catalysts. HYDROGENATION; CARBONACEOUS MATERIALS; COAL; BITUMINOUS COAL; CATALYSTS; LEAD; LEAD COMPOUNDS; LEAD OXIDES; LEAD SULFIDES; LEAD NITRATES; OXALATES; ACETATES; HALIDES; CHROMIUM OXIDES
- 02452 DESTRUCTIVE HYDROGENATION. Vieu, C. British Patent 442,023. 30 Jan 1936.  
Alkali or alkaline earth metals as catalysts. HYDROGENATION; COAL TAR; TAR; PITCHES; LIGNITE; CATALYSTS; ALKALI METALS; ALKALI METAL COMPOUNDS; ALKALINE EARTH METALS; ALKALINE EARTH METAL COMPOUNDS
- 02453 HYDROGENATION UNDER PRESSURE. French Patent 793,799. 31 Jan 1936.  
Use of Pb or Pb compounds with  $\text{H}_2\text{SO}_4$ , sulfates, acetic acid, formic acid, or sulfonic acids as catalyst. HYDROGENATION; CARBONACEOUS MATERIALS; CATALYSTS; LEAD; LEAD COMPOUNDS; SULFURIC ACID; SULFATES; ACETIC ACID; FORMIC ACID; SULFONIC ACIDS
- 02454 HYDROGENATING CARBONACEOUS MATERIALS. French Patent 794,437. 17 Feb 1936.  
Use of germanium sulfides, oxides, hydroxides, halides, or oxalates as catalysts in hydrogenation of carbonaceous materials. HYDROGENATION; CARBONACEOUS MATERIALS; GERMANIUM SULFIDES; GERMANIUM OXIDES; GERMANIUM COMPOUNDS; HALIDES; OXALATES; CATALYSTS; HYDROXIDES
- 02455 DESTRUCTIVE HYDROGENATION. Krauch, C.; Pier, M.; Simon, W. German (FRG) Patent 626,171. 21 Feb 1936.  
Use as catalysts of elements of 3rd or 4th group, active C, or  $\text{SiO}_2$  in first stage; use as catalysts of Co, Mo, W, or their compounds in second stage; 450° and 200 atm pressure. COAL; COAL TAR; ASPHALTS; HYDROGENATION; CATALYSTS; ACTIVATED CARBON; SILICON OXIDES; COBALT; MOLYBDENUM; TUNGSTEN; TUNGSTEN COMPOUNDS; MOLYBDENUM COMPOUNDS; COBALT COMPOUNDS; HIGH PRESSURE; HIGH TEMPERATURE
- 02456 DESTRUCTIVE HYDROGENATION. French Patent 794,936. 28 Feb 1936.  
Use of iron sulfide as catalyst. CARBONACEOUS MATERIALS; HYDROGENATION; CATALYSTS; IRON SULFIDES
- 02457 DESTRUCTIVE HYDROGENATION. French Patent 795,349. 11 Mar 1936.  
Hydrogenation of carbonaceous materials at high temperatures using a halogen, along with Mn, Fe, N; or Co or their compounds as catalysts. CARBONACEOUS MATERIALS; HYDROGENATION; CATALYSTS; HALOGENS; INORGANIC ACIDS; MANGANESE; MANGANESE COMPOUNDS; IRON; IRON COMPOUNDS; NICKEL; NICKEL COMPOUNDS; COBALT; COBALT COMPOUNDS; OXIDES; HYDROXIDES; SULFIDES; CARBONATES; ALKALI METALS; ALKALINE EARTH METALS
- 02458 DESTRUCTIVE HYDROGENATION. French Patent 795,375. 12 Mar 1936.  
Halogen as catalyst; 380 to 480° and 100 to

- 500 atm pressure. CARBONACEOUS MATERIALS; HYDROGENATION; HALOGENS; SULFATES; SULFITES; PHOSPHATES; ALKALI METAL COMPOUNDS; ALKALINE EARTH METAL COMPOUNDS; HIGH PRESSURE; HIGH TEMPERATURE
- 02459 CATALYTIC HYDROGENATION. British Patent 444,779. 27 Mar 1936.  
Use of iron sulfide catalyst; 470°. CATALYSIS; HYDROGENATION; CARBONACEOUS MATERIALS; IRON SULFIDES; LIQUID PRODUCTS; HYDROCARBONS; PRODUCTION; MINERAL OILS; HIGH TEMPERATURE
- 02460 TREATING CARBONACEOUS MATERIALS WITH HYDROGENATING GASES. British Patent 446,114. 24 Apr 1936.  
Germanium or germanium compounds as catalysts. CARBONACEOUS MATERIALS; HYDROGENATION; HYDROCARBONS; PRODUCTION; OILS; GERMANIUM; GERMANIUM COMPOUNDS
- 02461 HYDROGENATION. View, C. British Patent 446,494. 28 Apr 1936.  
Hydrogenation of solid fuels following activation by heating in the presence of basic reagents consisting of alkali or alkaline earth metals, their oxides, carbonates or hydroxides. HYDROGENATION; SOLID FUELS; LIGNITE; COAL; PEAT; ALKALI METALS; ALKALI METAL COMPOUNDS; ALKALINE EARTH METALS; ALKALINE EARTH METAL COMPOUNDS; OXIDES; CARBONATES; HYDROXIDES; AMMONIA
- 02462 DESTRUCTIVE HYDROGENATION. French Patent 797,911. 6 May 1936.  
Use of sulfur compounds to treat carbonaceous materials prior to hydrogenation. CARBONACEOUS MATERIALS; HYDROGENATION; HYDROGEN SULFIDES; CARBON SULFIDES; ORGANIC SULFUR COMPOUNDS; THIOUREA; THIOLS; ETHERS
- 02463 DESTRUCTIVE HYDROGENATION. British Patent 447,210. 14 May 1936.  
Prevention of corrosion of apparatus in presence of corrosive halogens by addition of sulfates or sulfites of alkali or alkaline earth metals or Zn. HYDROGENATION; CARBONACEOUS MATERIALS; EQUIPMENT; CORROSION PROTECTION; HALOGENS; SULFATES; SULFITES; ALKALI METAL COMPOUNDS; ALKALINE EARTH METAL COMPOUNDS; COAL; MOLYBDENUM OXIDES; LIQUID PRODUCTS; SOLIDS; GASEOUS PRODUCTS
- 02464 HYDROGENATING DISTILLABLE CARBONACEOUS MATERIALS SUCH AS COAL OR MINERAL OILS. Pier, M.; Simon, W.; Kroenig, W. (to Standard-I.G. Co.). US Patent 2,087,648. 20 Jul 1936.  
Use of Ni or Co iodides and Mo sulfide as catalysts. CARBONACEOUS MATERIALS; HYDROGENATION; COAL; MINERAL OILS; GASOLINE; PRODUCTION; HIGH TEMPERATURE; MEDIUM PRESSURE; CATALYSTS; NICKEL IODIDES; COBALT IODIDES; MOLYBDENUM SULFIDES
- 02465 HYDROGENATING CARBONACEOUS MATERIALS. (to International Hydrogenation Patents Co. Ltd.). British Patent 450,473. 20 Jul 1936.  
Conversion of coal to liquid products by spraying with HCl, mixing with Fe treated with NaOH reacted with H at 430° (97.5% conversion). COAL; HYDROGENATION; CATALYSTS; MANGANESE; IRON; NICKEL; COBALT; COBALT COMPOUNDS; IRON COMPOUNDS; NICKEL COMPOUNDS; MANGANESE COMPOUNDS; HYDROCHLORIC ACID; SODIUM HYDROXIDES; LIQUID PRODUCTS
- 02466 DESTRUCTIVE HYDROGENATION OF COAL AND OTHER SOLID CARBONACEOUS MATERIALS. Krauch, C.; Pier, M. (to I. G. Farbenind.). German (FRG) Patent 633,185. 21 Jul 1936.  
Use of metal sulfides other than Mo sulfides. COAL; HYDROGENATION; CARBONACEOUS MATERIALS; SULFIDES; CATALYSTS
- French Patent 800,971. 23 Jul 1936.  
Hydrogenation of carbonaceous materials in presence of silicic compounds. HYDROGENATION; CARBONACEOUS MATERIALS; SILICON COMPOUNDS; SILICON OXIDES; GELS; FLUORINE; HYDROFLUORIC ACID; METALS
- 02468 HYDROGENATING COAL, ETC. Pier, M.; Engel, B.; Kroenig, W. (to I. G. Farbenind.). German (FRG) Patent 633,825. 8 Aug 1936.  
Treatment under pressure in presence of NH<sub>4</sub>OH solution of H<sub>2</sub>MoO<sub>4</sub>. COAL; HYDROGENATION; AMMONIUM COMPOUNDS; HYDROXIDES; MOLYBDIC ACID; CATALYSTS; OILS
- 02469 DESTRUCTIVE HYDROGENATION. (to International Hydrogenation Patents Co. Ltd.). British Patent 452,429. 20 Aug 1936.  
Production of benzenes from middle oils containing phenols by fractionation and hydrogenation at 370 to 440° in presence of Mo and Zn catalyst. HYDROGENATION; BENZINE; PRODUCTION; CATALYSTS; MOLYBDENUM COMPOUNDS; ZINC COMPOUNDS; TUNGSTEN SULFIDES; OILS
- 02470 HYDROGENATING CARBONACEOUS MATERIALS. (to International Hydrogenation Patents Co. Ltd.). French Patent 804,094. 15 Oct 1936.  
Recovery of oily constituents from residues from destructive hydrogenation by heating residues in presence of hot fused metals and alloys. HYDROGENATION; COAL; CARBONACEOUS MATERIALS; STEAM; HIGH TEMPERATURE; METALS; ALLOYS; OILS; PRODUCTION
- 02471 HYDROGENATING COAL. Weissgerber, H.; Schulzke, I.; Weissgerber, U.; Kaffer, H. (to Ges. fuer Teerverwertung m. b. H.). German (FRG) Patent 638,637. 20 Nov 1936.  
Use of tetrahydronaphthalene to increase degree of hydrogenation. COAL; HYDROGENATION; TETRALIN
- 02472 DESTRUCTIVE HYDROGENATION. (to International Hydrogenation Patents Co. Ltd.). British Patent 457,198. 23 Nov 1936.  
Impregnation of solid carbonaceous materials prior to hydrogenation with aqueous solutions of soluble compounds of Fe or finely divided Fe plus a dissolved base. HYDROGENATION; CARBONACEOUS MATERIALS; IRON COMPOUNDS; IRON; ALKALI METAL COMPOUNDS
- 02473 DESTRUCTIVE HYDROGENATION. (to International Hydrogenation Patents Co. Ltd.). British Patent 457,211. 24 Nov 1936.  
Use of catalysts consisting of Pb or Pb compounds and halogen or H halide; use of PbCl<sub>2</sub> and CCl<sub>4</sub>. HYDROGENATION; CARBONACEOUS MATERIALS; CATALYSTS; LEAD; LEAD COMPOUNDS; HALOGENS; COAL; LEAD CHLORIDES; HIGH PRESSURE; HIGH TEMPERATURE; CARBON TETRACHLORIDE; LIQUID PRODUCTS
- 02474 CATALYTIC HYDROGENATION OF MATERIALS SUCH AS COAL AND OIL MIXTURES. Pier, M.; Simon, W.; Grassl, G. (to Standard-I.G. Co.). US Patent 2,100,354. 30 Nov 1936.  
At 200 to 700°C and >20 atm using granular Al, magnalium, or Al bronze. COAL; OILS; MIXTURES; HIGH TEMPERATURE; MEDIUM PRESSURE; CATALYSTS; PARTICLES; ALUMINIUM; BRONZE; HYDROGENATION
- 02475 HYDROGENATING CARBONACEOUS MATERIALS. Pier, M.; Kroenig, W. (to I. G. Farbenind.). German (FRG) Patent 639,842. 14 Dec 1936.  
Halogen or S compounds of solid metalloids or of NH<sub>4</sub> as catalysts; compounds of P, Se, Te, As, Sb, Si, Zr, and B as catalysts. CARBONACEOUS MATERIALS; HYDROGENATION; COAL; COAL TAR; OILS; LUBRICANTS; CATALYSTS; HALOGENS; SULFUR COMPOUNDS; PHOSPHORUS COMPOUNDS; SELENIUM COMPOUNDS; TELLURIUM COMPOUNDS; ARSENIC COMPOUNDS; ANTIMONY COMPOUNDS; SILICON COMPOUNDS; ZIRCONIUM COMPOUNDS; BORON COMPOUNDS; AMMONIUM COMPOUNDS
- 02467 DESTRUCTIVE HYDROGENATION. (to International Hydrogenation Patents Co. Ltd.).

- 02476 HYDROGENATION. (to International Hydrogenation Patents Co. Ltd.). French Patent 806,743. 23 Dec 1936.  
Treatment of distillable carbonaceous materials with hydrogenating gases in presence of catalysts composed of Pb salts of organic acids other than oleate. HYDROGENATION; CARBONACEOUS MATERIALS; CATALYSTS; LEAD COMPOUNDS
- 02477 HYDROGENATING FUELS. Varga, J. (to Deutsche Gold- und Silber-Scheideanstalt vorm. Roessler). German (FRG) Patent 639,762. 24 Dec 1936.  
Mo or W catalyst; high pressure and high temperature. HYDROGENATION; MOLYBDENUM; TUNGSTEN; CATALYSTS; SULFUR; HYDROGEN SULFIDES; COAL
- 02478 HYDROGENATING CARBONACEOUS MATERIALS. (to International Hydrogenation Patents Co. Ltd.). British Patent 458,856. 28 Dec 1936.  
Catalysts comprising preformed Pb salts of HCOOH or of organic sulfonic acids; 460° and 200 atm pressure. HYDROGENATION; CARBONACEOUS MATERIALS; PHENOLS; SULFUR COMPOUNDS; OXYGEN COMPOUNDS; CATALYSTS; LEAD COMPOUNDS; FORMATES; SULFONATES; PHOSPHATES; LIQUID PRODUCTS; ASPHALTS; SULFONIC ACIDS; COAL
- 02479 DESTRUCTIVE HYDROGENATION. Rapoport, I.E. Khim. Tverd. Topl.; 8: 967-81(1937).  
HYDROGENATION; REVIEWS
- 02480 ACTION OF AQUEOUS ALKALI ON A BITUMINOUS COAL. Kasehagen, L. Ind. Eng. Chem.; 29: 600-4(1937).  
Treatment with NaOH solutions (N to 100%) at 250 to 400° and from 20 to 30 hr. prior to hydrogenation; MoS<sub>2</sub> as catalyst. COAL; BITUMINOUS COAL; AQUEOUS SOLUTIONS; CATALYSTS; HYDROGENATION; SODIUM HYDROXIDES; HIGH TEMPERATURE; MOLYBDENUM SULFIDES
- 02481 CATALYTIC HYDROGENATION OF PHENOLIC OIL IN LOW-TEMPERATURE TAR. IV. EFFECT OF CATALYSTS ON THE COMPOSITION OF HYDROCARBONS FORMED. Ando, S. J. Soc. Chem. Ind., Japan; 40: 83-5(1937).  
Use of Mo oxide, Ni<sub>2</sub>O<sub>3</sub>, and I as catalysts; addition of S to Mo oxide to increase gasoline content and naphthalene hydrocarbons. HYDROGENATION; OILS; COAL TAR; PHENOLS; CATALYSTS; HYDROCARBONS; PRODUCTION; HIGH TEMPERATURE; HIGH PRESSURE; MOLYBDENUM OXIDES; NICKEL OXIDES; IODINE; GASOLINE; SYNTHETIC FUELS
- 02482 HYDROGENATION OF LOW-TEMPERATURE TAR BY LABORATORY-SCALE CONTINUOUS PLANTS. II. RESULTS OF SOME EXPERIMENTS. Ando, S. J. Soc. Chem. Ind., Japan; 40: 124-5(1937).  
Production of gasoline by hydrogenation of tar at 480° and 200 atm. COAL TAR; HYDROGENATION; GASOLINE; HIGH TEMPERATURE; HIGH PRESSURE; SYNTHETIC FUELS; PRODUCTION
- 02483 HIGH-PRESSURE HYDROGENATION OF LOW-TEMPERATURE TAR. Ando, S. J. Fuel Soc. Japan; 16: 21-30(1937).  
Production of gasoline, kerosene, and heavy oil. HYDROGENATION; AUTOCLAVES; CATALYSTS; GASOLINE; KEROSENE; OILS; TAR; PRODUCTION
- 02484 GASES OF HYDROGENATION AND OF PYROLYSIS. Puchkov, P.V. Khim. Tverd. Topl.; 8: 502-8(1937).  
COAL; HYDROGENATION; PYROLYSIS; HYDROCARBONS; GASEOUS PRODUCTS
- 02485 HYDROGENATION OF SOUTH AFRICAN COALS. Petrick, A.J.; Gaigher, B.; Groenwood, P. J. Chem. Met. Mining Soc. S. Africa; 38: 122-44(1937).  
At 95 to 100 atm and 450°C using MoS<sub>2</sub> catalyst. COAL; HYDROGENATION; SOUTH AFRICA;
- MOLYBDENUM SULFIDES; CATALYSTS; MEDIUM PRESSURE; HIGH TEMPERATURE
- 02486 INFLUENCE OF SULFUR ON THE HYDROGENATION OF LOW-TEMPERATURE TAR. Winter, H.; Free, G.; Monnig, H. Brennst.-Chem.; 18: 320-3(1937).  
(NH<sub>4</sub>)<sub>2</sub>MoO<sub>4</sub> on alumina gel as catalyst; H<sub>2</sub>WO<sub>4</sub> or Cr<sub>2</sub>O<sub>3</sub> as catalyst. COAL TAR; HYDROGENATION; SULFUR; CATALYSTS
- 02487 STATUS OF COAL BENEFICIATION. Lameck, P.; Nierhaus, H. Stahl Eisen; 57: 1041-8(1937).  
Comprehensive general review. REVIEWS; BIBLIOGRAPHIES; COAL; DESULFURIZATION; HYDROGENATION; COKE; RESEARCH PROGRAMS
- 02488 HYDROGENATION, WITH SPECIAL REFERENCE TO PRODUCTS OBTAINABLE. Williams, F.A. Oil Colour Trades J.; 92: 1859-61(1937).  
HYDROGENATION; COAL; CHEMICAL REACTIONS
- 02489 FIXED SOLID CATALYST FOR PRESSURE HYDROGENATION (OF COAL). Pier, M. Oel, Kohle, Erdoel, Teer; 13: 916-20(1937).  
Study of various phases as catalysts, temperature, pressures, refining and content of high boiling materials. HYDROGENATION; CATALYSTS; COAL
- 02490 CONTINUOUS HYDROGENATION OF COAL. I. DEVELOPMENT OF A LIQUID-PHASE PLANT. Booth, N.; Williams, F.A. J. Inst. Fuel; 11: 42-9(1937).  
Coal-in-oil. COAL PASTES; COAL; HYDROGENATION; INDUSTRIAL PLANTS; DESIGN; OILS
- 02491 DEVELOPMENT OF A PLANT ON A SEMILARGE SCALE FOR HYDROGENATING TAR OILS AND PRIMARY BITUMENS FROM BITUMINOUS COALS. Ruhl, G. Bergbau; 50: 289-98, 303-9(1937).  
Hydrogenation in both vapor and liquid phases. COAL TAR; HYDROGENATION; BITUMINOUS COAL
- 02492 HYDROGENATION OF THE COMPONENTS OF THE ALEKSANDRIISKII BROWN COAL. Vaisel'berg, K.B. Khim. Tverd. Topl.; 8: 232-46(1937).  
Bitumen, humic acids, and residual coal using FeO<sub>3</sub> and MoS<sub>2</sub> catalysts. COAL; HYDROGENATION; BITUMENS; HUMIC ACIDS; IRON OXIDES; MOLYBDENUM SULFIDES; CALCIUM OXIDES; CHEMICAL REACTION KINETICS
- 02493 TAR AS A FUEL. King, J.G.; Cawley, C.M. J. Inst. Fuel; 10: 48-51(1937).  
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- 02494 HYDROGENATION OF COAL AND PRIMARY TAR. Berthelot, C. Genie Civil; 110: 197-202(1937).  
Bergius process. HYDROGENATION; COAL; COAL TAR; BERGIUS PROCESS
- 02495 HYDROGENATION OF COALS AND OF BROWN COALS. I-IV. Mayor, Y. Rev. Industrielle; 67: 201-4, 238-40, 271-4, 309-10(1937).  
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- 02496 U. S. BUREAU OF MINES EXPERIMENTAL PLANT. Storch, H.H.; Hirst, L.L.; Golden, P.L.; Pinkel, I.I.; Boyer, R.L.; Schaeffer, J.R.; Kallenberger, R.H. Ind. Eng. Chem.; 29: 1377-80(1937).  
Design and operation of plant for continuous hydrogenation of coal. INDUSTRIAL PLANTS; COAL; HYDROGENATION; DESIGN; OPERATION
- 02497 HYDROGENATION. Sinnatt, F.S.; King, J.G.; MacFarlane, A. Ind. Eng. Chem.; 29: 133-40(1937).  
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- 02498 HYDROGENATION TESTS ON CANADIAN COAL. Warren, T.E.; Gilmore, R.E. Ind. Eng. Chem.; 29: 353-8(1937).  
Description of equipment and method developed at Fuel Research Labs. of Canadian Dept. of Mines. COAL; HYDROGENATION; BITUMINOUS COAL; EQUIPMENT
- 02499 COAL HYDROGENATION. COMPARISON OF HYDROGENATION PRODUCTS OF COAL AND OIL. Pier, M. Ind. Eng. Chem.; 29: 140-5(1937).  
Catalytic destructive hydrogenation of coals and tars in Germany with conversion almost entirely to low-boiling products. COAL; HYDROGENATION; TAR; LIQUID PRODUCTS; CATALYSTS; OILS; PRODUCTION
- 02500 HYDROGENATION OF CHINESE COALS. Hsiao, C.C.; Lo, C.L. J. Chem. Eng. China; 4: 248-54(1937).  
Noncatalyzed hydrogenation at 450°C and 290 atm. COAL; HYDROGENATION; CHINA; HIGH TEMPERATURE; HIGH PRESSURE; COAL TAR
- 02501 COAL HYDROGENATION. CHEMISTRY. Storch, H.H. Ind. Eng. Chem.; 29: 1367-71(1937).  
Critical review of physical and chemical factors including rank of coal, nature of solvent, type of catalyst, agitation, temperature, and pressure. COAL; HYDROGENATION; CHEMISTRY; REVIEWS
- 02502 HYDROGENATION OF LOW-TEMPERATURE TAR UNDER VARIOUS CONDITIONS. Winter, H. Chem. Ztg.; 61: 136(1937).  
Conversion of low-temperature tar from bituminous coal into high-quality motor fuel by destructive hydrogenation. HYDROGENATION; COAL TAR; BITUMINOUS COAL; SYNTHETIC FUELS; PRODUCTION; PHENOLS
- 02503 COAL BENEFICIATION AND MOTOR-FUEL SUPPLY. Herrmann, P. Teer u. Bitumen; 35: 281-6(1937).  
Discussion with respect to future in Germany. SYNTHETIC FUELS; CARBONIZATION; HYDROGENATION; COAL; PRODUCTION
- 02504 RESEARCHES ON HYDROGENATION CARRIED OUT AT THE FUEL RESEARCH STATION. Sinnatt, F.S.; Williams, F.A.; Cawley, C.M. Compt. Rend. 17me. Congr. Chim., Ind., Paris; Sep-Oct: 476-86(1937).  
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- 02505 CONTINUOUS HYDROGENATION OF COALS. Isobe, H.; Yendo, Y.; Ito, K. Bull. Inst. Phys. Chem. Research (Tokyo); 16: 1341-53(1937).  
Vapor-phase rehydrogenation of hydrogenated oils; behavior of stainless steel reaction vessel. PILOT PLANTS; COAL; HYDROGENATION; HIGH TEMPERATURE; HIGH PRESSURE
- 02506 DESTRUCTIVE HYDROGENATION. (to International Hydrogenation Patents Co. Ltd.). British Patent 459,268. 5 Jan 1937.  
Treatment of solid carbonaceous materials prior to destructive hydrogenation with S in one of several forms; formation of liquid products by destructive hydrogenation at 250 atm. pressure at 450°C. HYDROGENATION; CARBONACEOUS MATERIALS; SULFUR; HIGH PRESSURE; AUTOCLAVES; HIGH TEMPERATURE; LIQUID PRODUCTS
- 02507 DESTRUCTIVE HYDROGENATION. (to International Hydrogenation Patents Co. Ltd.). British Patent 460,151. 22 Jan 1937.  
Conversion of middle oils (end b.p. 325-350°) into benzines by treating 30-50% of crude material with hydrogenating gases at 350-450° in presence of catalysts; sulfides of Ni, Co, Fe, Zn, Mn. HYDROGENATION; BENZINE; PRODUCTION; CATALYSTS; HIGH TEMPERATURE; MOLYBDENUM; TUNGSTEN; NICKEL SULFIDES; COBALT SULFIDES; IRON SULFIDES; ZINC SULFIDES; MANGANESE SULFIDES; OILS
- 02508 CATALYTIC HYDROGENATION OF COAL, ETC. (to International Hydrogenation Patents Co. Ltd.). French Patent 807,929. 25 Jan 1937.  
Use of halogen acid, nonmetallic halogen compounds, Zn, Fe, or Sn and their compounds as catalysts. COAL; HYDROGENATION; CATALYSTS; TAR; ASPHALTS; PETROLEUM; HALOGENS; HALOGEN COMPOUNDS; ZINC COMPOUNDS; IRON COMPOUNDS; TIN COMPOUNDS
- 02509 DESTRUCTIVE HYDROGENATION. (to International Hydrogenation Patents Co. Ltd.). French Patent 809,398. 2 Mar 1937.  
Impregnation of carbonaceous materials before destructive hydrogenation by solutions of compounds of Mo or W or both; hydrogenation at 300-500° and 100-1000 atm. HYDROGENATION; CARBONACEOUS MATERIALS; MOLYBDENUM COMPOUNDS; TUNGSTEN COMPOUNDS; HIGH TEMPERATURE; HIGH PRESSURE
- 02510 LIQUID HYDROCARBONS. Pier, M.; Kroenig, W.; Simon, W. (to International Hydrogenation Patents Co. Ltd.). Canadian Patent 364,751. 16 Mar 1937.  
Treatment of bituminous coal with dilute H<sub>2</sub>SO<sub>4</sub> containing diisopropyl naphthalenesulfonic acid and NH<sub>4</sub> molybdate and addition to heavy oil from coal; addition of CCl<sub>4</sub>. CARBONACEOUS MATERIALS; COAL; HYDROGENATION; HIGH TEMPERATURE; CARBON TETRACHLORIDE; LIQUID PRODUCTS; SULFONIC ACIDS
- 02511 HYDROGENATING CARBONACEOUS MATERIALS. Krauch, C.; Pier, M. (to Standard-I. G. Co.). US Patent 2,115,336. 26 Apr 1937.  
Reaction with H at 200 to 700°C at >20 atm in presence of catalyst containing combined S. CARBONACEOUS MATERIALS; CATALYSTS; MOLYBDENUM OXIDES; ZINC OXIDES; MAGNESIUM OXIDES; HYDROGENATION
- 02512 MOTOR FUEL. Weissgerber, H.; Schulzke, I.; Weissgerber, U.; Kaffer, H. (to fur Teerverwertung G. m. b. H.). German (FRG) Patent 644,297-8. 28 Apr 1937.  
Hydrogenation of crude benzine produced in carbonization of brown coal is carried out at 350° and 110 atm in presence of active C. COAL; BENZINE; BROWN COAL; CARBONIZATION; HYDROGENATION; HIGH TEMPERATURE; HIGH PRESSURE; ACTIVATED CARBON; CATALYSTS; COAL TAR
- 02513 HYDROGENATING CARBONACEOUS MATERIALS. French Patent 812,160. 1 May 1937.  
Reaction temperature regulated by H or oil vapor introduced into reaction chamber. COAL; HYDROGENATION; HYDROGEN; OILS; VAPORS; TEMPERATURE DEPENDENCE
- 02514 DESTRUCTIVE HYDROGENATION. (to International Hydrogenation Patents Co. Ltd.). French Patent 812,218. 3 May 1937.  
CaSO<sub>4</sub>, Ca aluminate, or Ni compound catalysts. COAL; HYDROGENATION; CALCIUM SULFATES; CALCIUM OXIDES; ALUMINIUM OXIDES; CATALYSTS; NICKEL COMPOUNDS; TAR; OILS
- 02515 DESTRUCTIVE HYDROGENATION. (to International Hydrogenation Patents Co. Ltd.). British Patent 465,413. 5 May 1937.  
Production of hydrocarbons by treatment of distillable carbonaceous materials with hydrogenating gases at above 300° and above 20 atm.; use of Ag<sub>2</sub>CrO<sub>4</sub>, CuO, and compounds of metals of 7th and 8th groups as catalysts. HYDROGENATION; CARBONACEOUS MATERIALS; HIGH

- TEMPERATURE;HYDROCARBONS;PRODUCTION;MEDIUM PRESSURE;CATALYSTS;BROWN COAL;COAL
- 02516 DESTRUCTIVE HYDROGENATION. (to International Hydrogenation Patents Co. Ltd.). French Patent 47,511. 24 May 1937.  
Carbonaceous materials impregnated with Fe hydrate and alkaline solution. CARBONACEOUS MATERIALS;LIGNITE;IRON COMPOUNDS;HYDRATES;BASES; SOLUTIONS;HYDROGENATION
- 02517 CATALYTIC HYDROGENATION OF CARBONACEOUS MATERIALS, ETC. (to I.G. Farbenindustrie). British Patent 466,609. 1 Jun 1937.  
Catalysts of bleaching earths that do not give a jelly-like mass by treatment with liquid swelling agent for 1 hr.; e.g., Florida earth, Fuller's earth, Beidellite, Nontronite, etc.. CATALYSTS;HYDROGENATION;CARBONACEOUS MATERIALS; FULLERS EARTH;MINERALS;MONTMORILLONITE;AMMONIA
- 02518 DESTRUCTIVE HYDROGENATION OF SOLID CARBONACEOUS MATERIALS. (to International Hydrogenation Patents Co. Ltd.). British Patent 467,117. 11 Jun 1937.  
Use of Mo and/or W compounds in solution as catalysts; sulfide ores of Mo or W are very suitable. HYDROGENATION;CARBONACEOUS MATERIALS; CATALYSTS;MOLYBDENUM COMPOUNDS;TUNGSTEN COMPOUNDS
- 02519 DESTRUCTIVE HYDROGENATION OF COALS, TARS, MINERAL OILS, ETC. Pier, M.; Simon, W.; Kroenig, W. (to I. G. Farbenind.). German(FRG) Patent 646,405. 12 Jun 1937.  
Use of Cl, Br, or I compounds of V, Mo, or W as catalysts. COAL;HYDROGENATION;COAL TAR; LUBRICANTS;CATALYSTS;VANADIUM CHLORIDES; MOLYBDENUM CHLORIDES;TUNGSTEN CHLORIDES; VANADIUM BROMIDES;MOLYBDENUM BROMIDES;TUNGSTEN BROMIDES;VANADIUM IODIDES;MOLYBDENUM IODIDES; TUNGSTEN IODIDES;MINERAL OILS
- 02520 DESTRUCTIVE HYDROGENATION OF CARBONACEOUS SUBSTANCES. Pier, M.; Simon, W. (to I. G. Farbenind.). German(FRG) Patent 646,477. 15 Jun 1937.  
Use of Ge or Se compounds in association with halogen or halide of H as catalyst. CARBONACEOUS MATERIALS;HYDROGENATION;CATALYSTS; GERMANIUM;GERMANIUM COMPOUNDS;HALOGENS;HALIDES
- 02521 EXTRACTS AND HYDROGENATION PRODUCTS OF COAL, ETC. (to I. G. Farbenind.). French Patent 814,699. 28 Jun 1937.  
Prevention of polymerization, condensation, or oxidation by addition of high molecular weight organic or organometallic compounds. COAL;HYDROGENATION;PEAT;PYRIDINES;PIPERIDINES; QUINOLINES;AMINES;AMINO ACIDS;PHENOLS;QUINONES; THIOLS;VAPOR CONDENSATION;OXIDATION; POLYMERIZATION
- 02522 EXTRACTS FROM FUELS SUCH AS COAL, LIGNITE, OR PEAT. Pott, A.; Broche, H. US Patent 2,123,380. 12 Jul 1937.  
Solid fuels boiled with organic solvents at >100 atm and 330 to 415°C, filtered. COAL; LIGNITE;PEAT;HYDROGENATION;FILTRATION;HIGH TEMPERATURE;HIGH PRESSURE;ORGANIC SOLVENTS; BOILING
- 02523 HYDROGENATION CATALYSTS. Brown, C.L. (to Standard I. G. Co.). US Patent 2,123,623. 12 Jul 1937.  
Preparation by precipitating polysulfide of metal of groups V, VI, or VII from aqueous solution and heating to 350 to 600°C. COAL; CATALYSTS;HYDROGENATION;CHEMICAL PREPARATION; PRECIPITATION;SULFIDES;METALS;HEATING;HIGH TEMPERATURE;AQUEOUS SOLUTIONS
- 02524 MATERIAL FOR REMOVING SULFUR FROM GASES. Post, F.C. (to Compagnie des produits chimiques et charbons actifs Edouard Urbain). US Patent 2,124,260. 19 Jul 1937.  
Iron oxide deposited on lava foam. GASES; DESULFURIZATION;IRON OXIDES;LAVA;FOAMS;COATINGS
- 02525 DESTRUCTIVE HYDROGENATION OF COAL, ETC. Pier, M.; Kroenig, W.; Simon, W. (to I. G. Farbenind.). German(FRG) Patent 648,130. 2 Aug 1937.  
Hydrogenation of coal, tars, mineral oils in presence of catalyst that is added in a finely divided form after the material has been heated to the reaction temperature. COAL;HYDROGENATION; COAL TAR;CATALYSTS;MINERAL OILS
- 02526 LIQUID FUELS. (to I. G. Farbenindustrie). British Patent 470,072. 5 Aug 1937.  
Addition of stabilizers to products of hydrogenation of coal to prevent solidification. COAL;HYDROGENATION;RESIDUES; RESINS;ASPHALTS;PYRIDINES;QUINOLINES; PIPERIDINES;AMINES;PHENOLS;PYROGALLOL;QUINONES; ADDITIVES;LIQUID PRODUCTS
- 02527 DESTRUCTIVE HYDROGENATION OF COAL, ETC. (to International Hydrogenation Patents Co. Ltd.). French Patent 816,955. 21 Aug 1937.  
Using catalysts of Zn acetate or formate with halogen compounds. COAL;HYDROGENATION; CATALYSTS;ZINC COMPOUNDS;ACETATES;PEAT; CHLORINATED ALIPHATIC HYDROCARBONS;SULFUR CHLORIDES;AMMONIUM COMPOUNDS;CHLORIDES
- 02528 DESTRUCTIVE HYDROGENATION OF COAL, ETC. (to International Hydrogenation Patents Co. Ltd.). French Patent 816,954. 21 Aug 1937.  
Pretreatment of coal with oxidizing agents (air at 200°C; NO at 70°C; or Cl at 20 to 70°C). COAL;HYDROGENATION;OXIDATION;AIR;CHLORINE; NITROGEN OXIDES
- 02529 DESTRUCTIVE HYDROGENATION OF COALS, TARS, MINERAL OILS, ETC. Pier, M.; Simon, W. (to I. G. Farbenind.). German(FRG) Patent 650,087-8. 13 Sep 1937.  
Temperature 7300°C, pressure at least 50 atm, catalyst containing B or B compound. COAL; TAR;MINERAL OILS;HYDROGENATION;CATALYSTS;BORON; BORON COMPOUNDS
- 02530 DESTRUCTIVE HYDROGENATION. (to International Hydrogenation Patents Co. Ltd.). British Patent 472,354. 22 Sep 1937.  
Continuous production of hydrocarbons of high boiling point from hydrogenation of coal paste containing oil having an upper b.p. of 300°C; residues recycled. COAL;HYDROGENATION; COAL PASTES;OILS;BOILING POINTS;RESIDUES; AMMONIUM COMPOUNDS;MOLYBDATES
- 02531 HYDROGENATING COAL, ETC. (to International Hydrogenation Patents Co. Ltd.). French Patent 818,742. 2 Oct 1937.  
Oils mixed with alkali metal or NH<sub>3</sub> salts, heated, then mixed with coal for hydrogenation. COAL;HYDROGENATION;OILS;AMMONIUM COMPOUNDS; ALKALI METAL COMPOUNDS;HEATING;MIXTURES
- 02532 CATALYSTS FOR DESTRUCTIVE HYDROGENATION, ETC. (to I. G. Farbenindustrie). British Patent 473,082. 6 Oct 1937.  
Preparation of catalysts of carrier impregnated with oxides, sulfides, carbonates, formates, acetates, or oxalates of Mo, W, Cr, V, Zn, Sn, Pb, Fe, Co, or Ni. CHEMICAL REACTIONS;COAL;HYDROGENATION;CATALYSTS;PATENTS; CHEMICAL PREPARATION;MOLYBDENUM COMPOUNDS; TUNGSTEN COMPOUNDS;CHROMIUM COMPOUNDS;VANADIUM COMPOUNDS;ZINC COMPOUNDS;TIN COMPOUNDS;LEAD COMPOUNDS;IRON COMPOUNDS;COBALT COMPOUNDS; NICKEL COMPOUNDS;OXIDES;SULFIDES;CARBONATES; ACETATES;OXALATES;HYDROGEN;HYDROGEN SULFIDES;

- CARBON SULFIDES
- 02533 DESTRUCTIVE HYDROGENATION. Fujikawa, S. British Patent 473,107. 6 Oct 1937.  
Using paste made of aqueous solutions of metal salts ( $ZnCl_2$ ). COAL;HYDROGENATION;COAL PASTES;AQUEOUS SOLUTIONS;ZINC CHLORIDES
- 02534 DESTRUCTIVE HYDROGENATION AND CRACKING PROCESSES. Pier, M.; Simon, W.; Jacob, P. (to I. G. Farbenind.). German(FRG) Patent 651,473. 15 Oct 1937.  
Catalysts supported on carriers pretreated with H at high temperature and pressure. COAL; TAR;MINERAL OILS;HYDROGENATION;CATALYSTS; HYDROCARBONS;CRACKING;MOLYBDENUM COMPOUNDS;HIGH TEMPERATURE;HIGH PRESSURE;ACTIVATED CARBON
- 02535 MOTOR FUEL. Uhde, F.; Pfirrmann, T.W. French Patent 819,659. 23 Oct 1937.  
Preparation by hydrogenation of carbonaceous materials and adding oils rich in H. SYNTHETIC FUELS;COAL;HYDROGENATION;LIGNITE;HYDROGEN; ADDITIVES;OILS;PRODUCTION
- 02536 DESTRUCTIVE HYDROGENATION. (to International Hydrogenation Patents Co. Ltd.). French Patent 819,896. 28 Oct 1937.  
At 7250 atm and above 400°C. COAL; HYDROGENATION;HIGH PRESSURE;HIGH TEMPERATURE
- 02537 DESTRUCTIVE HYDROGENATION. (to International Hydrogenation Patents Co. Ltd.). French Patent 820,591. 15 Nov 1937.  
At >200 atm and above 300°C; dehydrogenation step. COAL;HYDROGENATION;OILS;DEHYDROGENATION; HIGH PRESSURE;HIGH TEMPERATURE
- 02538 DESTRUCTIVE HYDROGENATION OF COALS, TARS, MINERAL OILS, ETC. Pier, M.; Simon, W. (to I. G. Farbenind.). German(FRG) Patent 654,024. 10 Dec 1937.  
Catalysts of metal halides with metal of the 6th periodic group or their compounds. COAL; COAL TAR;MINERAL OILS;CATALYSTS;HYDROGENATION; IRON CHLORIDES;MOLYBDENUM OXIDES
- 02539 DESTRUCTIVE HYDROGENATION. (to International Hydrogenation Patents Co. Ltd.). French Patent 822,306. 28 Dec 1937.  
At 300 to 500°C using catalysts of sulfides and oxides of W, Mo, and V. CARBONACEOUS MATERIALS;HYDROGENATION;ASPHALTS;CATALYSTS;HIGH TEMPERATURE;TUNGSTEN OXIDES;MOLYBDENUM OXIDES; VANADIUM OXIDES;TUNGSTEN SULFIDES;MOLYBDENUM SULFIDES;VANADIUM SULFIDES
- 02540 TREATMENT OF COAL FOR THE PRODUCTION OF POWER MATERIALS. Thau, A. Z. Ver. Deut. Ing.; 82: 129-38(1938).  
28 references. COAL;DISTILLATION;SYNTHESIS GAS;PRODUCTION;METHANOL;COAL TAR;HYDROGENATION
- 02541 NEW COAL-UTILIZATION METHODS. Neuwirth, F. Osterr. Ing. Architekt. Ver.; 90: 196-201(1938).  
COAL GASIFICATION;COAL;HYDROGENATION;SOLVENT EXTRACTION;FISCHER-TROPSCH SYNTHESIS
- 02542 RECENT ADVANCES IN HIGH-PRESSURE AND HIGH-TEMPERATURE ENGINEERING FOR HYDROGENATION OF COAL. Utida, S. J. Fuel Soc. Japan; 17: 85-6(1938). (In English).  
COAL;HYDROGENATION;HIGH PRESSURE;HIGH TEMPERATURE;REVIEWS
- 02543 ACTION OF HYDROGEN UPON COAL. III. DEVELOPMENT OF A SMALL-SCALE LIQUID-PHASE CONTINUOUS PLANT. Booth, N.; Williams, F.A.; King, J.G. Dept. Sci. Ind. Research (Brit.), Fuel Research, Tech. Paper; No. 44, (1938).  
COAL;HYDROGENATION;PILOT PLANTS
- 02544 ANNUAL REPORT OF RESEARCH AND TECHNOLOGIC WORK ON COAL, FISCAL YEAR 1937. Fieldner, A.C. U. S. Bur. Mines, Circ.; No. 6992, (1938).  
Includes: coal hydrogenation, effects of vehicle in coal hydrogenation, and analytical methods for coal hydrogenation products. COAL; HYDROGENATION;RESEARCH PROGRAMS;CLEANING; REVIEWS;COLLOIDS;ELECTROLYTES
- 02545 DIESEL FUEL MIXTURES FROM BITUMINOUS COAL TAR OIL. Kolbel, H. Oel, Kohle, Erdoel, Teer; 14: 1042-9(1938).  
Using mixtures of coal tar oil and Kogasin II. BITUMINOUS COAL;COAL TAR;HYDROGENATION; PRODUCTION;SYNTHETIC FUELS
- 02546 HYDROGENATION-CRACKING OF TARS. Newall, H.E. Dept. Sci. Ind. Research; 48: 55p.(1938).  
At 750°C, HO catalyst; at 450°C, Mo oxide catalyst. COAL TAR;HYDROGENATION;PHENOLS; AROMATICS;MOLYBDENUM OXIDES;CATALYSTS;ACTIVATED CARBON;HIGH TEMPERATURE;PRODUCTION
- 02547 MOTOR FUELS FROM LOW-TEMPERATURE TARS. Wiclawek, B. Przemysl Naftowy; 13: 553-8(1938).  
COAL TAR;SYNTHETIC FUELS;HYDROGENATION; MOLYBDENUM;CATALYSTS;GASOLINE;PRODUCTION; DISTILLATION
- 02548 HYDROGENATION OF COAL IN FRANCE. Helm, J. Chem. Listy; 32: 155-8(1938).  
Catalyzed hydrogenation in liquid phase at 450 to 500°C and 200 atm. COAL;HYDROGENATION; FRANCE;COAL PASTES;HIGH TEMPERATURE;HIGH PRESSURE;HYDROCARBONS;GASEOUS PRODUCTS;GASOLINE; RESIDUES;CATALYSTS;POWDERS
- 02549 THERMAL REACTION AND HYDROGENATION OF COAL. IV. INVESTIGATIONS ON THE COURSE OF REACTION AT LOW TEMPERATURE (SHORT REACTION PERIOD). Morikawa, K.; Okamura, T.; Abe, R. J. Soc. Chem. Ind., Japan; 41: 431-4(1938).  
Up to 400° for 29 min using  $SnCl_2$  as catalyst. COAL;HYDROGENATION;HIGH TEMPERATURE; TIME DEPENDENCE;CATALYSTS;TIN CHLORIDES
- 02550 THERMAL REACTION AND HYDROGENATION OF COAL. V. INVESTIGATION ON THE COURSE OF REACTION AT LOW TEMPERATURE (LONG REACTION PERIOD). Morikawa, K.; Yamagata, K.; Abe, R. J. Soc. Chem. Ind., Japan; 41: 434-6(1938).  
Up to 356° for 484 min using  $SnCl_2$  as catalyst. COAL LIQUEFACTION;HIGH TEMPERATURE; TIME DEPENDENCE;CATALYSTS;TIN CHLORIDES;COPPER CHLORIDES
- 02551 CATALYSTS FOR THE HYDROGENATION OF FUSHUN COAL. VIII. SEARCH FOR INORGANIC CATALYSTS. Abe, R.; Huzikawa, S.; Kakutani, T.; Okamura, T. J. Soc. Chem. Ind., Japan; 41: 417-19(1938).  
When Fushun coal was used,  $ZnCl_2$ ,  $SnCl_2$ ,  $Co(OH)_2$ ,  $ZnCl_2 + NiCl_2$ ,  $Co(OH)_2 + Cu_2Cl_2$ ,  $MgCl_2 \times 6 H_2O$ ,  $FeCl_2$ ,  $FeCl_3 \times 6 H_2O$ ,  $ZnS$ ,  $ZnSO_4$ ,  $ZnCrO_4$ . When Lynn tar was used,  $Cu_2Cl_2$ ,  $ZnCl_2$ ,  $ZnCl_2 \rightarrow MoO_3 \rightarrow WO_3 \rightarrow V_2O_5$ ,  $MoS_2$ ,  $MoO_3$ ,  $SnCl_2 \times 2 H_2O$ ,  $CoCl_2 \times 6 H_2O$ ,  $Cu_2Cl_2$ ,  $V_2O_5$ ,  $MnO_2$ ,  $Fe_2O_3$ ,  $Fe(OH)_3$ ,  $FeCl_3 \times 6 H_2O$ ,  $FeCl_2$ , and  $WO_3$ . COAL; COAL TAR;HYDROGENATION;HIGH TEMPERATURE;MEDIUM PRESSURE;CATALYSTS;ZINC CHLORIDES;TIN CHLORIDES; COBALT HYDROXIDES;NICKEL CHLORIDES;COPPER CHLORIDES;MAGNESIUM CHLORIDES;IRON CHLORIDES; ZINC SULFIDES;ZINC SULFATES;ZINC COMPOUNDS; CHROMIUM OXIDES;MOLYBDENUM OXIDES;TUNGSTEN OXIDES;VANADIUM OXIDES;MOLYBDENUM SULFIDES; COBALT CHLORIDES;COPPER CHLORIDES;MANGANESE OXIDES;IRON OXIDES;IRON HYDROXIDES
- 02552 CATALYSTS FOR THE HYDROGENATION OF FUSHUN COAL. IX. RESEARCH ON METALLIC CHLORIDE CATALYSTS. Abe, R.; Huzikawa, S.; Kakutani, T.; Sugiyama, K. J. Soc. Chem.

- Ind., Japan; 41: 419-21(1938).  
 $CdCl_2$ ,  $NiCl_2$ , and  $MoCl_2$  are promoters of  $CuCl_2$  catalyst;  $SnCl_2$  is excellent catalyst while  $ZnCl_2$  and  $CuCl_2$  are poor catalysts in the hydrogenation of Fushun coal. COAL; HYDROGENATION; CADMIUM CHLORIDES; NICKEL CHLORIDES; PROMOTERS; CATALYSTS; COPPER CHLORIDES; TIN CHLORIDES; ZINC CHLORIDES
- 02553 EXPERIMENTS ON THE CONTINUOUS HYDROGENATION OF COAL. Booth, N.; Williams, F.A. J. Inst. Fuel; 11: 493-502(1938).  
 180 to 250 atm and  $Sn(OH)_2$  catalyst. COAL; HYDROGENATION; PILOT PLANTS; CATALYSTS; TIN HYDROXIDES; HIGH PRESSURE; PRESSURE DEPENDENCE; TEMPERATURE DEPENDENCE; HIGH TEMPERATURE; COAL PASTES
- 02554 CATALYTIC HYDROGENATION OF PHENOLIC OIL IN LOW-TEMPERATURE TAR. V. EFFECT OF HYDROGENATING CONDITIONS UPON THE COMPOSITION OF THE HYDROCARBONS FORMED. Ando, S. J. Soc. Chem. Ind., Japan; 41: 126-9(1938).  
 $NH_4$  molybdate,  $MoS_3$  + S, or  $MoO_3$ ; 425 to 499; 50 to 100 atm pressure. HYDROGENATION; COAL TAR; PHENOLS; HYDROCARBONS; PRODUCTION; AMMONIUM COMPOUNDS; MOLYBDATES; MOLYBDENUM OXIDES; SULFUR; HIGH TEMPERATURE; HIGH PRESSURE
- 02555 HIGH-PRESSURE HYDROGENATION OF LOW-TEMPERATURE TAR. X. COMPARISON OF TARS FROM BITUMINOUS COAL AND LIGNITE. Ando, S. J. Soc. Chem. Ind., Japan; 41: 411-12(1938).  
 At 450 to 465° and 215 to 230 atmospheres pressure using  $MoO_3$  as a catalyst. BITUMINOUS COAL; COAL TAR; LIGNITE; HYDROGENATION; HIGH TEMPERATURE; HIGH PRESSURE; CATALYSTS; MOLYBDENUM OXIDES; PRODUCTION; GASOLINE; COMPARATIVE EVALUATIONS; COAL
- 02556 HIGH-PRESSURE HYDROGENATION OF LOW-TEMPERATURE TAR. Ando, S. J. Soc. Chem. Ind., Japan; 41: 292-5B(1938).  
 At 466 to 472° and 200 atmospheres pressure using a catalyst consisting of pumice impregnated with  $NH_4$  thiomolybdate. COAL TAR; HYDROGENATION; HIGH TEMPERATURE; HIGH PRESSURE; CATALYSTS; AMMONIUM COMPOUNDS; SULFUR COMPOUNDS; MOLYBDENUM OXIDES
- 02557 PROCESS OF POTT AND BROCHE FOR PRESSURE EXTRACTION AND HYDROGENATION OF COAL. Sander, A. Teer u. Bitumen; 36: 269-71(1938).  
 COAL; HYDROGENATION; POTT AND BROCHE PROCESS; SOLVENT EXTRACTION
- 02558 NEW GERMAN PLANT FOR THE HYDROGENATION OF COAL BY THE PROCESS OF POTT AND BROCHE. Gillet. A.C. Rev. Universelle Mines; 14: 653-5(1935).  
 Involves dissolution of coal in a solvent. COAL; HYDROGENATION; POTT AND BROCHE PROCESS; AQUEOUS SOLUTIONS; SOLVENTS; HIGH PRESSURE; GERMAN WORK
- 02559 COAL HYDROGENATION INDUSTRY AND ITS FUTURE. Kita, G. Chem. Rev.; 4: 291-2(1938).  
 COAL; HYDROGENATION; REVIEWS
- 02560 HIGH-PRESSURE HYDROGENATION OF LOW-TEMPERATURE TAR. VIII. COMPARISON OF LOW-TEMPERATURE TARS CARBONIZED AT DIFFERENT TEMPERATURES. Ando, S.; Usiba, T. J. Soc. Chem. Ind., Japan; 41: 315-16(1938).  
 HYDROGENATION; COAL TAR; HIGH TEMPERATURE; TEMPERATURE DEPENDENCE
- 02561 HYDROGENATION OF VARIOUS TARS AND OILS. Ando, S. J. Fuel. Soc. Japan; 17: 33-42(1938).  
 In 2 reaction chambers in series, catalyst of  $NH_4$  thiomolybdate; also hydrogenation of middle oils using molybdic oxide catalyst.
- MINERAL OILS; SHALE OIL; HYDROGENATION; AMMONIUM COMPOUNDS; CATALYSTS; MOLYBDATES; MOLYBDENUM OXIDES
- 02562 HIGH-PRESSURE HYDROGENATION OF LOW-TEMPERATURE TAR. IX. COMPARISON OF FRACTIONS FROM LOW-TEMPERATURE TAR. Ando, S.; Usiba, T. J. Soc. Chem. Ind., Japan; 41: 390-1(1938).  
 At 454° and 464° and 100 atm. pressure using  $MoO_3$  as catalyst. TAR; HYDROGENATION; HIGH TEMPERATURE; HIGH PRESSURE; CATALYSTS; MOLYBDENUM OXIDES; PRODUCTION; GASOLINE; AROMATICS
- 02563 HYDROGENATION OF COAL AND COAL-TAR OILS UNDER TURBULENT FLOW CONDITIONS. Morgan, G.T.; Veryard, J.T. J. Soc. Chem. Ind.; 57: 152-62(1938).  
 Coal in anthracene oil; 200 atm pressure; 560°. COAL; COAL TAR; TURBULENT FLOW; HYDROGENATION; HIGH TEMPERATURE; HIGH PRESSURE; TUBES
- 02564 ADVANCES IN COAL RESEARCH AND TECHNOLOGY. Fieldner, A.C.; Rice, W.E. Mining Congr. J.; 24: No. 2, 50-2(1938).  
 COAL; RESEARCH PROGRAMS; REVIEWS; HYDROGENATION
- 02565 STUDIES PERTAINING TO THE CATALYTIC HYDROGENATION OF PYROLYTIC TARS. Smith, H.M.; Rall, H.T.; Grandone, P. U.S. Bur. Mines. Tech. Paper; 587: 36p.(1938).  
 Using Fe, Pd, Ni, and Co catalysts. COAL TAR; HYDROGENATION; CATALYSTS; NAPHTHALENE; PLATINUM; PALLADIUM; NICKEL; COBALT
- 02566 HIGH-PRESSURE HYDROGENATION OF VARIOUS TARS. II. HYDROGENATION OF VARIOUS TARS AND OILS IN A CONTINUOUS PLANT. Ando, S. J. Soc. Chem. Ind., Japan; 41: 215-17(1938).  
 At 470 to 490°C and 200 Atm using  $NH_4$  thiomolybdate catalyst. COAL TAR; OILS; HYDROGENATION; HIGH TEMPERATURE; AMMONIUM COMPOUNDS; CATALYSTS; HIGH PRESSURE; GASOLINE; PRODUCTION; MOLYBDENUM OXIDES; SULFUR COMPOUNDS; HYDROCARBONS; PRODUCTION
- 02567 HIGH-PRESSURE HYDROGENATION OF VARIOUS TARS. III. HYDROGENATION OF MIDDLE OILS OBTAINED BY THE HYDROGENATION OF VARIOUS TARS AND OILS. J. Soc. Chem. Ind., Japan; 247-8(1938).  
 COAL TAR; OILS; HYDROGENATION; GASOLINE; PRODUCTION; FRACTIONATION; HYDROCARBONS
- 02568 DESTRUCTIVE HYDROGENATION. (to International Hydrogenation Patents Co. Ltd.). British Patent 477,944. 10 Jan 1938.  
 Greater than 250 atm pressure; sulfides and oxides of heavy metals (W, Mo, V, and Re) as catalysts. CARBONACEOUS MATERIALS; HYDROGENATION; ASPHALTS; CATALYSTS; HIGH PRESSURE; TUNGSTEN OXIDES; MOLYBDENUM OXIDES; VANADIUM OXIDES; RHENIUM OXIDES; TUNGSTEN SULFIDES; MOLYBDENUM SULFIDES; VANADIUM SULFIDES; RHENIUM SULFIDES
- 02569 DESTRUCTIVE HYDROGENATION OF COAL. (to I. G. Farbenind.). German (FRG) Patent 656,364. 5 Feb 1938.  
 Catalyzed hydrogenation of coal and oil product of particle size <10  $\mu$ . COAL; HYDROGENATION; COAL PASTES; CATALYSTS; PARTICLES; PARTICLE SIZE; OILS
- 02570 CATALYTIC CONVERSION OF MATERIALS SUCH AS COAL, OILS, AND TARS. Pier, M.; Simon, W.; Kroenig, W. (to Standard-I.G. Co.). US Patent 2,191,156. 20 Feb 1938.  
 Treatment with excess free H at 250 to 700°C and >50 atm using nonbasic catalyst and admixture of acidic substance to neutralize 80% of products of basic reaction. COAL; HYDROGENATION; TAR; OILS; HIGH TEMPERATURE; MEDIUM PRESSURE; CATALYSTS

- 02571 DESTRUCTIVE HYDROGENATION. (to International Hydrogenation Patents Co. Ltd.). British Patent 481,141. 7 Mar 1938.  
Coal pastes mixed with Sn oxalate and  $\text{NH}_4\text{Cl}$ , heated with H at 250 atm to 460°C. COAL; HYDROGENATION; COAL PASTES; TIN COMPOUNDS; OXALATES; AMMONIUM COMPOUNDS; CHLORIDES; HIGH TEMPERATURE; HIGH PRESSURE; CATALYSTS
- 02572 HYDROGENATING CARBONACEOUS MATERIALS. (to International Hydrogenation Patents Co. Ltd.). French Patent 825,687. 10 Mar 1938.  
Passing over metal compounds of high catalytic activity and in form of spheres or Raschig rings. CARBONACEOUS MATERIALS; HYDROGENATION; CATALYSTS; MOLYBDENUM OXIDES; ZINC OXIDES; MAGNESIUM OXIDES; HIGH TEMPERATURE; COLUMN PACKING; SPHERES
- 02573 LIQUID HYDROCARBONS. (to International Hydrogenation Patents Co. Ltd.). French Patent 825,682. 10 Mar 1938.  
Hydrogenation of products from distillation of carbonaceous materials in liquid phase in presence of W sulfide, or mixture of molybdic acid, ZnO, and MgO; 50 atm pressure; 200 to 400°. HYDROCARBONS; PRODUCTION; LIQUID PRODUCTS; CARBONACEOUS MATERIALS; DISTILLATION; TUNGSTEN SULFIDES; MOLYBDIC ACID; ZINC OXIDES; MAGNESIUM OXIDES; HIGH TEMPERATURE; HIGH PRESSURE; HYDROGENATION
- 02574 HYDROGENATING FUELS, ETC. Krauch, C.; Pier, M. (to I. G. Farbenind.). German (FRG) Patent 657,703. 11 Mar 1938.  
At 550°C and 200 atm using W or W compounds with Mo as catalyst. COAL; WOOD; PEAT; HYDROGENATION; CATALYSTS; TUNGSTEN; TUNGSTEN COMPOUNDS; MOLYBDENUM; HIGH TEMPERATURE; HIGH PRESSURE
- 02575 DESTRUCTIVE HYDROGENATION. (to International Hydrogenation Patents Co. Ltd.). British Patent 481,875. 15 Mar 1938.  
Coal pastes mixed with Sn oxalate and  $\text{NH}_4\text{Cl}$ , reacted with H at 460°C under 250 atm; halogen removed with  $\text{Ca}(\text{OH})_2$ . COAL; COAL PASTES; HYDROGENATION; CALCIUM HYDROXIDES; TIN COMPOUNDS; OXALATES; AMMONIUM COMPOUNDS; CHLORIDES; HIGH TEMPERATURE; HIGH PRESSURE; CHEMICAL REACTIONS; CATALYSTS
- 02576 HYDROGENATION OF CARBONACEOUS MATERIALS. Fischer, E.; Skoda, F. French Patent 826,081. 22 Mar 1938.  
800°C and 5000 atm, no catalyst. COAL; COKE; CHARCOAL; HYDROGENATION; VERY HIGH PRESSURE; LIQUID PRODUCTS; HYDROCARBONS
- 02577 DESTRUCTIVE HYDROGENATION. (to I. G. Farbenindustrie). British Patent 482,431. 29 Mar 1938.  
Of various fractions with appropriate temperature, pressure, and catalyst. CARBONACEOUS MATERIALS; HYDROGENATION; HIGH TEMPERATURE; HIGH PRESSURE; AROMATICS
- 02578 DESTRUCTIVE HYDROGENATION. French Patent 826,454. 31 Mar 1938.  
Catalytic hydrogenation of extraction products at high temperature and pressure using catalysts of Fe, Fe oxide, or Fe hydrate, limonite or bauxite decomposition residues. CARBONACEOUS MATERIALS; SOLIDS; HYDROGENATION; HIGH TEMPERATURE; HIGH PRESSURE; IRON; IRON OXIDES; IRON COMPOUNDS; HYDRATES; MINERALS
- 02579 DESTRUCTIVE HYDROGENATION OF CARBONACEOUS MATERIALS. (to International Hydrogenation Patents Co. Ltd.). French Patent 827,024. 14 Apr 1938.  
Reaction temperature controlled by introduction of cooling agent into reaction vessel. CARBONACEOUS MATERIALS; COAL; HYDROGENATION; COOLING; COOLANTS; TEMPERATURE DEPENDENCE
- 02580 HYDROGENATION OF COAL DISTILLATION AND EXTRACTION PRODUCTS. Moehrlie, E. (to Akt.-Ges. fuer Steinkohleverflüssigung und Steinkohleverdichtung). German (FRG) Patent 659,233. 28 Apr 1938.  
Hydrogenation of products from distillation and extraction of coal at pressures above 100 atm. COAL; DISTILLATION; HYDROGENATION; SOLVENT EXTRACTION; HIGH PRESSURE; SULFUR; CATALYSTS; SYNTHETIC FUELS; PRODUCTION
- 02581 HYDROGENATING BITUMINOUS MATERIALS. (to International Hydrogenation Patents Co. Ltd.). French Patent 827,600. 28 Apr 1938.  
Preliminary extraction using  $\text{C}_6\text{H}_6$ , then using deca- or tetrahydronaphthalene or hydrogenated anthracene at 7300°C and 150 kg/cm<sup>2</sup> pressure. COAL; BITUMINOUS COAL; HYDROGENATION; SOLVENT EXTRACTION; BENZENE; ANTHRACENE; HIGH TEMPERATURE; HIGH PRESSURE; TETRALIN
- 02582 DESTRUCTIVE HYDROGENATION. (to International Hydrogenation Patents Co. Ltd.). British Patent 484,132. 2 May 1938.  
Treatment with NO, then Sn oxalate,  $\text{NH}_4\text{Cl}$ , and H at 450° and 250°C. COAL; BITUMINOUS COAL; HYDROGENATION; NITROGEN OXIDES; CHEMICAL REACTIONS; TIN COMPOUNDS; OXALATES; AMMONIUM COMPOUNDS; CHLORIDES; CATALYSTS; HIGH TEMPERATURE
- 02583 CATALYTIC HYDROGENATION. British Patent 484,127. 2 May 1938.  
At 350°C in liquid phase using catalyst of  $\text{MoO}_3$ , ZnO, and MgO. CARBONACEOUS MATERIALS; HYDROGENATION; COAL TAR; HIGH TEMPERATURE; CATALYSTS; MOLYBDENUM OXIDES; ZINC OXIDES; MAGNESIUM OXIDES; HYDROCARBONS; PRODUCTION
- 02584 TRANSFORMING CARBONACEOUS MATERIALS. Pier, M.; Simon, W.; Jacob, P. (to I. G. Farbenind.). German (FRG) Patent 659,925. 13 May 1938.  
Using catalysts consisting of, or having present as carrier, masses containing  $\text{SiO}_2$ , metals or metal compounds previously treated with F or HF. CARBONACEOUS MATERIALS; CATALYSTS; HYDROGENATION; SILICON OXIDES; HYDROFLUORIC ACID; FLUORINE; CHEMICAL REACTIONS; METALS
- 02585 EFFECTING CATALYTIC REACTIONS SUCH AS DESTRUCTIVE HYDROGENATION OF COALS, TARS OR OILS, ETC. Pier, M.; Simon, W.; Jacob, P. (to Standard-I.G. Co.). US Patent 2,159,511. 23 May 1938.  
Using a metal sulfide catalyst. COAL; COAL TAR; HYDROGENATION; HIGH TEMPERATURE; MEDIUM PRESSURE; CATALYSTS; METALS; SULFIDES
- 02586 CATALYTIC HYDROGENATION OF CARBONACEOUS MATERIALS. (to International Hydrogenation Patents Co. Ltd.). British Patent 486,492. 3 Jun 1938.  
Using reaction cooling agents, H, N,  $\text{CH}_4$ , oils, oily coal pastes. CARBONACEOUS MATERIALS; HYDROGENATION; COOLING; CATALYSTS; CHEMICAL REACTION KINETICS; TEMPERATURE DEPENDENCE; HYDROCARBONS; PRODUCTION; HYDROGEN; NITROGEN; METHANE; COAL PASTES; OILS
- 02587 DESTRUCTIVE HYDROGENATION. German (FRG) Patent 661,003. 10 Jun 1938.  
At 250 to 500°C at high pressure using metallic vessels activated occasionally with iodine or iodine compounds. PITCHES; COAL; HYDROGENATION; HIGH TEMPERATURE; HIGH PRESSURE; IODINE; IODINE COMPOUNDS
- 02588 DESTRUCTIVE HYDROGENATION. (to International Hydrogenation Patents Co. Ltd.). British Patent 486,994. 14 Jun 1938.

- At 400°C and 250 Atm using catalyst of 10 parts W sulfide supported on 90 parts "Terra". CARBONACEOUS MATERIALS; HYDROGENATION; HYDROCARBONS; PRODUCTION; HIGH TEMPERATURE; HIGH PRESSURE; TUNGSTEN SULFIDES; CATALYSTS; MATRIX MATERIALS
- 02589 DESTRUCTIVE HYDROGENATION. British Patent 487,892. 28 Jun 1938.  
Using Zn salts of carboxylic acids of low molecular weight (less than 5 C atoms) preferably with an addition of halogen. COAL; COAL PASTES; HYDROGENATION; HIGH TEMPERATURE; HIGH PRESSURE; CATALYSTS; ZINC COMPOUNDS; CARBOXYLIC ACIDS; MOLECULAR WEIGHT; HALOGENS; BITUMINOUS COAL; PRODUCTION; BENZINE; GASOLINE; ASPHALTS
- 02590 HYDROGENATING COAL, ETC. German(FRG) Patent 661,539. 1 Jul 1938.  
At high temperature and pressure using catalyst of Mo compound sorbed on charcoal. COAL; HYDROGENATION; COAL TAR; MINERAL OILS; MOLYBDENUM COMPOUNDS; CHARCOAL; CELLULOSE
- 02591 THERMAL TREATMENT OF CARBONACEOUS MATERIALS. British Patent 488,651. 7 Jul 1938.  
Using phosphates or sulfates of Mn, Fe, Cu, or Zn and one or more of the metals Mo, Sn, W, Re, U, V, Cr, Ni, or Co or compounds thereof. COAL; COAL TAR; OILS; COAL GAS; HYDROGENATION; HIGH TEMPERATURE; MEDIUM PRESSURE; CATALYSTS; MANGANESE PHOSPHATES; IRON PHOSPHATES; COPPER PHOSPHATES; ZINC PHOSPHATES; MANGANESE SULFATES; IRON SULFATES; COPPER SULFATES; ZINC SULFATES; MOLYBDENUM; TIN; TUNGSTEN; RHENIUM; URANIUM; VANADIUM; CHROMIUM; NICKEL; COBALT; MOLYBDENUM COMPOUNDS; TIN COMPOUNDS; TUNGSTEN COMPOUNDS; RHENIUM COMPOUNDS; URANIUM COMPOUNDS; VANADIUM COMPOUNDS; CHROMIUM COMPOUNDS; NICKEL COMPOUNDS; COBALT COMPOUNDS
- 02592 DESTRUCTIVE HYDROGENATION. British Patent 498,856. 11 Jul 1938.  
At 355° and 250 atmospheres pressure using sulfides of the 5th, 6th, or Fe group of the periodic table as catalysts. COAL; BROWN COAL; COAL PASTES; HYDROGENATION; HIGH TEMPERATURE; HIGH PRESSURE; CATALYSTS; MOLYBDENUM SULFIDES; ZINC SULFIDES; MAGNESIUM SULFIDES
- 02593 HYDROGENATING COAL EXTRACTS. Pier, M.; Donath, E. German(FRG) Patent 663,542. 12 Aug 1938.  
Under pressure at 20°C in presence of Sn oxalate and NH<sub>4</sub>Cl. COAL; HYDROGENATION; CONDENSED AROMATICS; HYDROCARBONS; PRODUCTION; CRESOLS; HIGH TEMPERATURE; HIGH PRESSURE; SOLVENT EXTRACTION; GASEOUS PRODUCTS
- 02594 DESTRUCTIVE HYDROGENATION OF CARBONACEOUS MATERIALS. Pier, M. German(FRG) Patent 664,385. 30 Aug 1938.  
Using Ge or a compound of Ge in association with S or a compound of bivalent S as catalyst. COAL; COAL TAR; HYDROGENATION; CATALYSTS; GERMANIUM SULFIDES
- 02595 DESTRUCTIVE HYDROGENATION OF SOLID CARBONACEOUS MATERIALS. British Patent 492,551. 22 Sep 1938.  
Coal suspended in oil; tin oxalate and NH<sub>4</sub>Cl as catalysts. HYDROGENATION; COAL; BITUMINOUS COAL; COAL PASTES; TIN COMPOUNDS; OXALATES; AMMONIUM COMPOUNDS; CHLORIDES; CATALYSTS
- 02596 EXTRACTING AND HYDROGENATING SOLID CARBONACEOUS MATERIALS. (to I. G. Farbenindustrie). British Patent 494,834. 1 Nov 1938.  
At 250 to 470° and 20 to 500 atmospheres using metal halides as catalysts; refining hydrogenation of extracts is accomplished at 475° and 50 atmospheres pressure using WS<sub>2</sub> as catalyst. CARBONACEOUS MATERIALS; SOLVENT EXTRACTION; HYDROGENATION; MEDIUM TEMPERATURE; HIGH TEMPERATURE; MEDIUM PRESSURE; HIGH PRESSURE; CATALYSTS; METALS; HALIDES; TUNGSTEN SULFIDES
- 02597 DESTRUCTIVE HYDROGENATION OF CARBONACEOUS MATERIALS. Donath, E.; Pier, M. German(FRG) Patent 669,049. 15 Dec 1938.  
Following pretreatment of the material by subjecting it to H at 1000 atmospheres pressure or more and 300 to 350°. CARBONACEOUS MATERIALS; HYDROGENATION; HIGH TEMPERATURE; HIGH PRESSURE; VERY HIGH PRESSURE; CATALYSTS
- 02598 DESTRUCTIVE HYDROGENATION OF CARBONACEOUS MATERIALS. Krauch, C.; Pier, M. German(FRG) Patent 669,015. 15 Dec 1938.  
Using Cr or a compound of Cr alone or with Mo or other catalyst. CARBONACEOUS MATERIALS; HYDROGENATION; HIGH TEMPERATURE; HIGH PRESSURE; CATALYSTS; CHROMIUM; CHROMIUM COMPOUNDS; MOLYBDENUM
- 02599 SUBSTITUTES FOR PETROLEUM IN USSR. Nekrasov, P. Planovoe Khoz.; No. 11, 28-44(1939).  
USSR; SYNTHETIC FUELS; COAL; HYDROGENATION; PRODUCTION; REVIEWS
- 02600 HYDROGENATION OF THE PETROGRAPHIC CONSTITUENTS OF HIGH SPLINT SEAM COAL. Wright, C.C.; Sprunk, G.C. Penna. State Coll., Mineral Ind. Expt. Sta., Bull.; 28: 23p.(1939).  
Catalytic and noncatalytic. COAL; HYDROGENATION; CATALYSTS; PRECIPITATION; HIGH TEMPERATURE
- 02601 HYDROGENATION OF THE BANDED CONSTITUENTS OF COAL-FUSAIN. Fisher, C.H.; Sprunk, G.C.; Eisner, A.; Clarke, L.; Storch, H.H. Ind. Eng. Chem.; 31: 190-5(1939).  
400, 415, and 430° and 1000 lb/in<sup>2</sup> in presence of tetralin and SnS. HYDROGENATION; COAL; HIGH TEMPERATURE; MEDIUM PRESSURE; TETRALIN; TIN SULFIDES
- 02602 EFFECT OF MINERAL AND ORGANIC ACIDS ON THE HYDROGENATION OF THE ALEKSANDRIISK BROWN COAL. Makh, G.M. J. Appl. Chem. USSR (Engl. Transl.); 12: 457-66(1939).  
Effects of individual components of ash (SiO<sub>2</sub>, CaO, Fe<sub>2</sub>O<sub>3</sub>, Al<sub>2</sub>O<sub>3</sub>, MgO, and Na<sub>2</sub>O) on results using de-ashed coal. Effects of Fe(OH)<sub>3</sub>, MoS<sub>3</sub>, or FeS<sub>2</sub> catalysts on results. BROWN COAL; COAL; HYDROGENATION; SILICON OXIDES; CALCIUM OXIDES; IRON OXIDES; ALUMINIUM OXIDES; MAGNESIUM OXIDES; SODIUM OXIDES; CATALYSTS; IRON HYDROXIDES; MOLYBDENUM SULFIDES; IRON SULFIDES
- 02603 PROGRESS IN COAL RESEARCH AND TECHNOLOGY. Fieldner, A.C.; Rice, W.E. Mining Congr. J.; 25: No. 2, 38-40(1939).  
COAL; RESEARCH PROGRAMS; HYDROGENATION; REVIEWS
- 02604 HYDROGENATION OF THE BANDED CONSTITUENTS OF COAL—ATTRITAL MATTER AND ANTHRAXYLON. Fisher, C.H.; Sprunk, G.C.; Eisner, A.; Clarke, L.; Storch, H.H. Ind. Eng. Chem.; 31: 1155-61(1939).  
Prediction of residue yields on basis of petrographic properties. COAL; HYDROGENATION; COAL LIQUEFACTION; LIQUID PRODUCTS; PETROLOGY
- 02605 EVOLUTION OF THE TECHNIQUE OF THE HYDROGENATION OF COAL AND HEAVY OILS. Berthelot, C. Genie Civil; 114: 214-16, 234-7(1939).  
COAL; OILS; HYDROGENATION; REVIEWS
- 02606 CATALYTIC HYDROGENATION OF PHENOLIC OIL IN LOW-TEMPERATURE TAR. VII. EFFECT OF CATALYSTS UPON THE FORMATION OF LOWER PHENOLS. Ando, S. J. Soc. Chem. Ind., Japan; 42: 171-

- 3(1939).  
Using  $\text{FeCl}_2$ ,  $\text{CaCl}_2$ ,  $\text{SnCl}_2$ ,  $\text{SnCl}_2 + \text{Fe}_2\text{O}_3$ ,  $(\text{NH}_4)_2\text{MoO}_4 + \text{Fe}_2\text{O}_3$ ,  $\text{WO}_3$ ,  $\text{Fe}_2\text{O}_3$  as catalysts.  
TAR; HYDROGENATION; PRODUCTION; PHENOLS; CATALYSTS;  
IRON CHLORIDES; CALCIUM CHLORIDES; TIN CHLORIDES;  
IRON OXIDES; AMMONIUM COMPOUNDS; MOLYBDATES;  
TUNGSTEN OXIDES
- 02607 HYDROGENATION REACTION OF COAL AND LIGNITE. REACTIONS OF THE CATALYTIC HIGH-PRESSURE HYDROGENATION OF COAL AND OIL AND THEIR CONTROL. Pier, M. Trans. Faraday Soc.; 35: 967-79(1939).  
Outline of chemical and physical process occurring. COAL; COAL TAR; OILS; OIL SHALES; HYDROGENATION
- 02608 COAL HYDROGENATION. Storch, H.H.; Fieldner, A.C. Mech. Eng.; 61: 605-11(1939).  
Effects of reaction temperature and time on gasoline yield. COAL; HYDROGENATION; PRODUCTION; GASOLINE; TEMPERATURE DEPENDENCE; TIME DEPENDENCE
- 02609 LIQUID-PHASE HYDROGENATION OF PITTSBURGH SEAM COAL. Hirst, L.L.; Hawk, C.O.; Sprunk, G.C.; Golden, P.L.; Pinkel, I.I.; Boyer, R.L.; Schaeffer, J.R.; Kallenberger, R.H.; Hamilton, H.A.; Storch, H.H. Ind. Eng. Chem.; 31: 869-77(1939).  
At 440° and 200 to 300 atmospheres pressure. COAL; HYDROGENATION; HIGH TEMPERATURE; HIGH PRESSURE; TEMPERATURE DEPENDENCE; PRESSURE DEPENDENCE; TIME DEPENDENCE
- 02610 HYDROGENATION OF LOW-TEMPERATURE TAR BY LABORATORY SCALE CONTINUOUS PLANTS. III. PRELIMINARY EXPERIMENTS ON THE TEMPERATURE OF (THE) HIGH-TEMPERATURE SEPARATOR. Ando, S. J. Soc. Chem. Ind., Japan; 42: 232-4(1939).  
At 468 to 470° and 200 atmospheres pressure using  $\text{NH}_4$  thiomolybdate as catalyst. COAL TAR; HYDROGENATION; HIGH TEMPERATURE; HIGH PRESSURE; CATALYSTS; AMMONIUM COMPOUNDS; SULFUR COMPOUNDS; MOLYBDENUM OXIDES; SEPARATION PROCESSES; TEMPERATURE DEPENDENCE
- 02611 HIGH-PRESSURE HYDROGENATION OF LOW-TEMPERATURE TAR. XIII. COMPARISON OF CARRIERS IN THE MOLYBDENUM CATALYSTS. Ando, S. J. Soc. Chem. Ind., Japan; 42: 213-15(1939).  
At 440 to 442° and 100 atmospheres pressure using  $\text{NH}_4$  molybdate as catalyst. COAL TAR; HYDROGENATION; HIGH TEMPERATURE; HIGH PRESSURE; CATALYSTS; AMMONIUM COMPOUNDS; MOLYBDENUM OXIDES; CARRIERS; CLAYS; GELS; ALUMINIUM HYDROXIDES; ASBESTOS
- 02612 HIGH-PRESSURE HYDROGENATION OF LOW-TEMPERATURE TAR. XII. LOW-TEMPERATURE HYDROGENATION OF LOW-TEMPERATURE TAR MIDDLE OIL. Ando, S. J. Soc. Chem. Ind., Japan; 42: 147-50(1939).  
At 370 to 402° and 100 to 110 atmospheres pressure using a catalyst prepared by adding S to  $\text{MoO}_3$  obtained from  $\text{HNO}_3$  and hot  $\text{NH}_4$  molybdate solution. COAL TAR; HYDROGENATION; HIGH TEMPERATURE; HIGH PRESSURE; CATALYSTS; MOLYBDENUM SULFIDES; PRODUCTION; GASOLINE
- 02613 HIGH-PRESSURE HYDROGENATION OF LOW-TEMPERATURE TAR. XI. COMPARISON OF MOLYBDENUM AND TUNGSTEN CATALYSTS. Ando, S.; Usiba, T. J. Soc. Chem. Ind., Japan; 41: 27-9(1939).  
Mo and W oxides and  $\text{NH}_4$  molybdate and tungstate. COAL TAR; HYDROGENATION; HIGH TEMPERATURE; HIGH PRESSURE; CATALYSTS; MOLYBDENUM OXIDES; TUNGSTEN OXIDES; AMMONIUM COMPOUNDS; PRODUCTION; GASOLINE; COMPARATIVE EVALUATIONS
- 02614 MULTIPLE TESTS ON CATALYSTS FOR COAL HYDROGENATION. Warren, T.E.; Bowles, K.W.; Gilmore, R.E. Ind. Eng. Chem., Anal. Ed.; 11: 415-19(1939).  
At 445° and 204 atmospheres pressure using stannous oxide or  $\text{NH}_4$  molybdate as catalysts. COAL; HYDROGENATION; HIGH TEMPERATURE; HIGH PRESSURE; CATALYSTS; TIN OXIDES; AMMONIUM COMPOUNDS; MOLYBDENUM OXIDES
- 02615 HYDROGENATING CARBONACEOUS MATERIALS. Pier, M.; Kroenig, W. (to I.G. Farbenind.). German(FRG) Patent 670,717. 24 Jan 1939.  
Use of catalysts obtained by treating a volatile S compound with a heavy metal or a compound of a heavy metal such as the oxide for hydrogenation of coal tars at less than 50 atmospheres pressure. COAL TAR; HYDROGENATION; MEDIUM PRESSURE; CATALYSTS; MIXTURES; TUNGSTEN OXIDES; ZINC OXIDES; WATER; MEDIUM TEMPERATURE; HIGH PRESSURE
- 02616 DESTRUCTIVE HYDROGENATION. Pier, M.; Simon, W. (to I. G. Farbenind.). German(FRG) Patent 671,183. 1 Feb 1939.  
Using a halide of H as the catalyst. COAL; COAL TAR; LUBRICANTS; HYDROGENATION; HIGH TEMPERATURE; CATALYSTS; HALIDES; HYDROGEN
- 02617 FUEL FOR DIESEL MOTORS. (to International Hydrogenation Patents Co. Ltd.). British Patent 500,282. 6 Feb 1939.  
A two step hydrogenation using elements of group 6, Fe, Zn, or Sn in the presence of  $\text{H}_2\text{SO}_4$  or halides of H as catalysts in the first step and W or Mo sulfides in the presence of F or HF as catalysts in the second step. CARBONACEOUS MATERIALS; HYDROGENATION; HIGH TEMPERATURE; MEDIUM PRESSURE; HIGH PRESSURE; CATALYSTS; IRON COMPOUNDS; ZINC COMPOUNDS; TIN COMPOUNDS; HALIDES; SULFURIC ACID; TUNGSTEN SULFIDES; MOLYBDENUM SULFIDES; FLUORINE; HYDROFLUORIC ACID; PRODUCTION; GASOLINE; SYNTHETIC FUELS
- 02618 HYDROGENATING FUELS. Varga, J. (to Deutsche Gold- und Silber-Scheideanstalt vormals Roessler). German(FRG) Patent 671,884. 23 Feb 1939.  
Regulation of  $\text{H}_2\text{S}$  concentration during hydrogenation. COAL; HYDROGENATION; CATALYSTS; MOLYBDENUM; TUNGSTEN; HYDROGEN SULFIDES
- 02619 HYDROGENATING SOLID CARBONACEOUS MATERIALS. Pier, M.; Jacob, P.; Kroenig, W. (to I. G. Farbenind.). German(FRG) Patent 673,732. 9 Mar 1939.  
Production of liquid hydrocarbons by hydrogenation of ground coal at 470° and 200 atmospheres pressure using as catalyst a solution of molybdic acid chloride in  $\text{HCONH}_2$ . COAL; HYDROGENATION; HIGH TEMPERATURE; HIGH PRESSURE; CATALYSTS; MOLYBDENUM COMPOUNDS; MOLYBDENUM CHLORIDES; SOLUTIONS; FORMAMIDE
- 02620 HYDROCARBONS. Meatschappij, O. (to N. V. Internationale Hydrogeneerings and International Hydrogenation Patents Co.). French Patent 839,663. 7 Apr 1939.  
Hydrogenation of coal or coal extracts at above 430° and at least 300 atmospheres pressure in the presence of catalysts. COAL; COAL TAR; HYDROGENATION; HIGH TEMPERATURE; HIGH PRESSURE; CATALYSTS
- 02621 DESTRUCTIVE HYDROGENATION OF OILS. Suzuki, S.; Mitui, K.; Takahasi, I. (to Minister of Navy). Japanese Patent 129,971. 3 May 1939.  
Preheating at 100 to 300°C in presence of catalyst. DISTILLATES; COAL TAR OILS; OILS; HIGH TEMPERATURE; HYDROGENATION; CATALYSTS; COAL
- 02622 EXTRACTION AND HYDROGENATION OF COAL. (to I. G. Farbenindustrie). British Patent 505,294. 9 May 1939.  
Introduction of low-boiling substances (benzene). COAL PASTES; COAL; SOLVENT EXTRACTION; TETRALIN; HYDROGENATION; BENZINE; CHEMICAL REACTION KINETICS



- 02623 DESTRUCTIVE HYDROGENATION. Pier, M.; Simon, W. (to I. G. Farbenind.). German(FRG) Patent 677,104. 19 Jun 1939. Using catalysts containing P, As, Se, or Te or their compounds. CARBONACEOUS MATERIALS; HYDROGENATION; HIGH TEMPERATURE; CATALYSTS; PHOSPHORUS COMPOUNDS; ARSENIC COMPOUNDS; SELENIUM COMPOUNDS; TELLURIUM COMPOUNDS
- 02624 DESTRUCTIVE HYDROGENATION. Pier, M.; Simon, W.; Grassl, G. (to I. G. Farbenind.). German(FRG) Patent 677,206. 21 Jun 1939. Using as a catalyst Pb or a compound of Pb in association with a halogen or a halide of H. COAL; HYDROGENATION; CATALYSTS; LEAD; LEAD COMPOUNDS; HALOGENS; HALIDES; HYDROGEN COMPOUNDS
- 02625 HYDROGENATING CARBONACEOUS MATERIALS. (to N. V. Internationale Hydrogeneeringsoetrootien Maatschappij). French Patent 844,921. 4 Aug 1939. At 300-500° and 300-500 atm pressure in presence of catalysts. COAL; HYDROGENATION; CATALYSTS; HIGH TEMPERATURE; HIGH PRESSURE
- 02626 HYDROGENATION OF CARBONACEOUS MATERIAL. (to International Hydrogenation Patent Company). French Patent 845,601. 29 Aug 1939. Suspended coal in oil hydrogenated at >300°C and >50 atm. CARBONACEOUS MATERIALS; HYDROGENATION; HIGH TEMPERATURE; LIQUIDS; COAL; MEDIUM PRESSURE
- 02627 GAS FOR SYNTHESIS OF FUELS. (to C. Otto and Comp. GmbH). French Patent 846,588. 20 Sep 1939. Hydrocarbons from coke furnaces converted into H and CO, mixed with blast-furnace gases for use in Fischer-Tropsch synthesis. FISCHER-TROPSCH SYNTHESIS; HYDROCARBONS; COKE; HYDROGENATION; CARBON MONOXIDE; DESULFURIZATION; BLAST FURNACES; GASEOUS PRODUCTS; COAL
- 02628 LOW-BOILING HYDROCARBONS. Kurokawa, S. (to Nenryo Kenkyuziotyo). Japanese Patent 132,582. 11 Oct 1939. Production from coal, coal tar, tar, mineral oil, or their mixtures treated with acid substances and hydrogenated at high temperature and pressure. COAL; COAL TAR; MINERAL OILS; CATALYSTS; HYDROGENATION; HIGH TEMPERATURE; HIGH PRESSURE; SLURRIES; PH VALUE
- 02629 TREATING HYDROGENATION PRODUCTS. (to International Hydrogenation Patent Company). French Patent 848,654. 3 Nov 1939. Removal of O-containing aliphatic compounds, then subjection of residue to heat treatment. COAL; HYDROGENATION; ALCOHOLS; ALDEHYDES; KETONES; ESTERS; SODIUM COMPOUNDS; SULFITES; MEDIUM PRESSURE; HEATING
- 02630 PRODUCTION OF HYDROCARBON GASES BY HYDROGENATION OF CARBONACEOUS MATERIALS. Dent, F.J. (to Institution of Gas Engineers). British Patent 514,302. 6 Nov 1939. At about 800°C and >5 atm hydrocarbon treated with alkali metal or compound. HYDROCARBONS; PRODUCTION; CARBONACEOUS MATERIALS; HYDROGENATION; MEDIUM PRESSURE; HIGH TEMPERATURE; ALKALI METALS; ALKALI METAL COMPOUNDS; SODIUM; POTASSIUM CARBONATES
- 02631 LIQUID HYDROCARBONS. (to I. G. Farbenindustrie). French Patent 850,809. 27 Dec 1939. Addition of gaseous olefins to increase yield of liquid hydrocarbons from hydrogenation of coals, tars, mineral oils, and other carbonaceous materials. HYDROCARBONS; PRODUCTION; LIQUIDS; COAL; MINERAL OILS; COAL TAR; HYDROGENATION; ALKENES; GASES; ADDITIVES
- 02632 HIGH-PRESSURE HYDROGENATION OF LOW-TEMPERATURE TAR. XV. SOME OBSERVATIONS ON THE REACTION MECHANISM. Ando, S. J. Soc. Chem. Ind., Japan; 43: 35-40(1940). At 459 to 475°C and 80 to 100 atm using MoO<sub>3</sub> or MoO<sub>3</sub>-S catalyst. TAR; HYDROGENATION; CHEMICAL REACTION KINETICS; HIGH TEMPERATURE; MEDIUM PRESSURE; MOLYBDENUM OXIDES; SULFUR; CATALYSTS; AROMATICS; HYDROCARBONS; PRODUCTION
- 02633 HYDROGENATION OF CANNEL COALS AND THEIR PETROGRAPHIC CONSTITUENTS. Fisher, C.H.; Sprunk, G.C.; Eisner, A.; Clarke, L.; Fein, M.L.; Storch, H.H. Fuel; 19: 84-9, 110-18(1940). CANNEL COAL; COAL; HYDROGENATION; PRODUCTION; LIQUID PRODUCTS; OILS
- 02634 HYDROGENATION OF HIGH-VOLATILE BITUMINOUS COALS. Hirst, L.L.; Storch, H.H.; Fisher, C.H.; Sprunk, G.C. Ind. Eng. Chem.; 32: 864-71(1940). Effect of rank on oil, tar acid and base, and total aromatic yields. COAL; HYDROGENATION; BITUMINOUS COAL; OILS; COAL TAR; COAL RANK; AROMATICS
- 02635 OILY HYDROCARBONS. (to International Hydrogenation Patents Co.). French Patent 851,335. 6 Jan 1940. Catalytic hydrogenation of carbonaceous materials in presence of alkali or alkaline earth sulfides and Fe compounds as catalysts. COAL; COAL TAR; MINERAL OILS; HYDROGENATION; SULFIDES; ALKALI METAL COMPOUNDS; ALKALINE EARTH METAL COMPOUNDS; IRON COMPOUNDS; CATALYSTS
- 02636 HYDROGENATION OF COAL EXTRACTS. Pott, A.; Broche, H. German(FRG) Patent 687,898. 18 Jan 1940. Using catalysts of halides (except chlorides) of low-valence heavy metals and Mg. COAL EXTRACTS; COAL; HYDROGENATION; BROMIDES; IODIDES; FLUORIDES; MAGNESIUM COMPOUNDS; METALS
- 02637 COAL TREATMENT FOR THE PRODUCTION OF FUEL, ETC. Fuchs, W.M. (to Pennsylvania Research Corp.). US Patent 2,242,822. 20 May 1940. Oxidation treatment and removal of oxidized material prior to hydrogenation. COAL; HYDROGENATION; BITUMINOUS COAL; NITRIC ACID; FURFURAL; SEPARATION PROCESSES; OXIDATION
- 02638 COMBUSTIBLE GAS AND COKE FROM CARBONACEOUS MATERIALS. Dent, F.J. (to Institution of Gas Engineers). British Patent 522,640. 24 Jun 1940. At >5 atm pressure and approximately 800°C. COAL; HYDROGENATION; MEDIUM PRESSURE; HIGH TEMPERATURE; STEAM; METHANE; PRODUCTION; HYDROGEN; CARBONACEOUS MATERIALS
- 02639 HYDROCARBON GASES FROM COAL. Dreyfus, H. US Patent 2,210,117. 6 Aug 1940. Heating coal to 200 to 400°C under >10 atm pressure with extraction agent; hydrogenation of extract at >20 atm pressure using catalyst. COAL; HYDROGENATION; HIGH TEMPERATURE; MEDIUM PRESSURE; NAPHTHALENE; PHENOLS; SOLVENT EXTRACTION; CATALYSTS
- 02640 HYDROGENATION OF YOUNG BROWN COAL. Korenig, W.; Donath, E.; Pier, M. (to I. G. Farbenindustrie). German(FRG) Patent 696,316. 15 Aug 1940. Using preheater, then converter at >300 atm and >460°C. COAL; BROWN COAL; HYDROGENATION; MEDIUM PRESSURE; HIGH TEMPERATURE
- 02641 HYDROGENATION OF COAL AND ITS PRODUCTS. Pier, M.; Simon, W.; Grassl, G. (to I. G. Farbenindustrie). German(FRG) Patent 696,809.

- 29 Aug 1940.  
Finely divided bronze catalyst. COAL;  
HYDROGENATION; CATALYSTS; BRONZE
- 02642 HYDROCARBON PRODUCTS FROM EXTRACTS SUCH  
AS THOSE OF COAL. Pier, M.; Donath, E. (to  
Standard-I.G. Co.). US Patent 2,215,190. 17  
Sep 1940.  
By hydrogenation of treated extracts at  
420°C and 600 atm in presence of Sn oxalate and  
NH<sub>4</sub>Cl. HYDROCARBONS; LIQUID PRODUCTS; GASEOUS  
PRODUCTS; SOLVENT EXTRACTION; COAL EXTRACTS;  
PRODUCTION; HYDROGENATION; TETRALIN; COAL; HIGH  
PRESSURE; HIGH TEMPERATURE
- 02643 HYDROGENATION OF COAL. Biggs, B.S.;  
Weiler, J.F. (to Carnegie Institute of  
Technology). US Patent 2,215,206. 17 Sep  
1940.  
At >100 atm using catalyst which promotes  
hydrogenation and desulfurization; catalyzed  
hydrogenation of extracted oils at <280°C and  
>50 atm. COAL; HYDROGENATION; POWDERS; HIGH  
PRESSURE; DESULFURIZATION; HIGH TEMPERATURE;  
SULFUR; REMOVAL
- 02644 HYDROCARBON OILS FROM COALS, TARS,  
MINERAL OILS, AND THEIR PRODUCTS. Pier, M.  
(to I. G. Farbenindustrie). German(FRG)  
Patent 697,949. 26 Sep 1940.  
Using catalysts of tin ammonium chloride and  
halogen or H halide. HYDROCARBONS; PRODUCTION;  
TIN CHLORIDES; AMMONIUM COMPOUNDS; CATALYSTS; COAL;  
COAL TAR; MINERAL OILS; HALOGENS; HALIDES; POWDERS;  
SOLUTIONS; HYDROGENATION
- 02645 HYDROCARBON OF OILS FROM COAL, TAR,  
OIL, AND THEIR PRODUCTS. Pier, M.; Kroenig,  
W.; Jacob, P. (to I. G. Farbenindustrie).  
German(FRG) Patent 698,969. 24 Oct 1940.  
Hydrogenation of fraction with b.p. >300°C  
using halide catalysts and alkaline earth  
compounds; fluid residue treated at 20 to 100°C  
with 0.5 to 2% halogen-free alkali or NH<sub>4</sub> salts  
(sulfates, phosphates, or carbonates). COAL;  
COAL TAR; OILS; HYDROCARBONS; HYDROGENATION;  
ALKALINE EARTH METAL COMPOUNDS; SULFATES;  
CARBONATES; PHOSPHATES; AMMONIUM COMPOUNDS; ALKALI  
METAL COMPOUNDS; SULFATES; PHOSPHATES; CARBONATES;  
HALIDES; CATALYSTS; PRODUCTION
- 02646 HYDROGENATION OF COAL AND ITS  
DISTILLATION AND EXTRACTION PRODUCTS. Pier,  
M.; Simon, W.; Grassl, G. (to I. G.  
Farbenindustrie). German(FRG) Patent 699,428.  
31 Oct 1940.  
Evaluation of catalysts of HCl with Al,  
magnesium, or Al bronze. COAL; HYDROGENATION;  
COAL EXTRACTS; DISTILLATES; CATALYSTS;  
HYDROCHLORIC ACID; ALUMINIUM; MAGNESIUM; BRONZE;  
POWDERS
- 02647 HYDROGENATION OF COAL AND ITS PRODUCTS.  
Pier, M.; Simon, W.; Grassl, G. (to I. G.  
Farbenindustrie). German(FRG) Patent 699,492.  
31 Oct 1940.  
Using catalysts of Fe, Co, Ni, Mn, or HCl.  
COAL; HYDROGENATION; HYDROCHLORIC ACID; COAL  
EXTRACTS; POWDERS; CATALYSTS; HYDROCHLORIC ACID;  
IRON; COBALT; NICKEL; MANGANESE
- 02648 HYDROGENATION OF COAL, TAR, AND MINERAL  
OILS. Pier, M.; Simon, W.; Kroenig, W. (to  
I. G. Farbenindustrie). German(FRG) Patent  
699,656. 7 Nov 1940.  
Addition of acid salts of polybasic acids.  
HYDROGENATION; PRODUCTION; HYDROCARBONS; COAL; TAR;  
MINERAL OILS; MAGNESIUM PHOSPHATES; ZINC  
PHOSPHATES; CADMIUM PHOSPHATES; CHROMIUM  
PHOSPHATES; SULFITES; SULFATES; ZINC COMPOUNDS;  
ALUMINIUM COMPOUNDS; TITANIUM COMPOUNDS; TIN  
COMPOUNDS; LEAD COMPOUNDS; VANADIUM COMPOUNDS;  
BISMUTH COMPOUNDS; CHROMIUM COMPOUNDS; MOLYBDENUM  
COMPOUNDS; TUNGSTEN COMPOUNDS; URANIUM COMPOUNDS;
- IRGN COMPOUNDS; NICKEL COMPOUNDS; COBALT  
COMPOUNDS
- 02649 HYDROGENATION OF BITUMINOUS PRODUCTS.  
Pfirrmann, T.W. (to Friedrich Uhde and  
Theodor W. Pfirrmann). German(FRG) Patent  
699,824. 7 Nov 1940.  
Catalysts of Zn and Fe chlorides dissolved  
in phenols. CARBONACEOUS MATERIALS;  
HYDROGENATION; HALIDES; BITUMINOUS COAL; RESIDUES;  
CATALYSTS; SOLVENTS; PHENOLS; IRON CHLORIDES; ZINC  
CHLORIDES
- 02650 HYDROGENATION CATALYSTS. (to  
Gesellschaft fuer Teerverwertung mbH).  
German(FRG) Patent 700,434. 21 Nov 1940.  
Iodine or compounds yielding I or HI. IODINE;  
IODINE COMPOUNDS; HYDRIODIC ACID; CATALYSTS; COAL;  
HYDROGENATION
- 02651 HYDROGENATION OF COAL-EXTRACTION AND -  
HYDROGENATION PRODUCTS. Pier, M.; Donath, E.  
(to I. G. Farbenindustrie). German(FRG)  
Patent 700,321. 21 Nov 1940.  
Pre-hydrogenation steam distillation in  
vacuo for removal of asphalt and resins. COAL  
EXTRACTS; HYDROGENATION; ASPHALTS; RESINS; STEAM;  
DISTILLATION; LOW PRESSURE; SEPARATION PROCESSES
- 02652 HYDROGENATION OF COAL AND ITS PRODUCTS.  
Pier, M.; Simon, W.; Grassl, G. (to I. G.  
Farbenindustrie). German(FRG) Patent 701,513.  
19 Dec 1940.  
<1% H halide used; polymerization avoided.  
COAL; HYDROGENATION; HALIDES; POLYMERIZATION;  
CATALYSTS; GASES; LIQUIDS
- 02653 HYDROGENATION OF COAL DISTILLATES.  
(to Deutsche Hydrierwerke). German(FRG)  
Patent 701,936. 24 Dec 1940.  
At 400 to 550° using Sb or its compounds.  
COAL; DISTILLATES; MINERAL OILS; SHALE OIL;  
HYDROGENATION; HIGH TEMPERATURE; ANTIMONY;  
ANTIMONY COMPOUNDS; VOLATILITY; CATALYSTS
- 02654 HIGH-PRESSURE HYDROGENATION OF SEMI-COKE  
FROM BROWN AND BITUMINOUS COALS. Sustmann, H.;  
Weinrotter, F. Brennst.-Chem.; 22: 229-  
36(1941).  
Effects of starting materials, temperature,  
pressure, and catalyst on yields. COKE;  
HYDROGENATION; BROWN COAL; BITUMINOUS COAL;  
AROMATIC; CATALYSTS; MOLYBDENUM SULFIDES; HIGH  
TEMPERATURE; OILS; BITUMENS
- 02655 HYDROGENATION OF COAL BY SEMITECHNICAL  
PLANT. Kurokawa, M.; Hirota, W.; Takeya, G.;  
Takenaka, Y. J. Soc. Chem. Ind. Japan; 44:  
776-9(1941).  
Hydrogenation at 410° and 200 atm; use of  
Ni<sub>2</sub>O<sub>3</sub>, SnCl<sub>2</sub>, ZnCl<sub>2</sub>, or SnCl<sub>2</sub> + NH<sub>4</sub>Cl as  
catalyst. COAL; HYDROGENATION; HIGH TEMPERATURE;  
HIGH PRESSURE; CATALYSTS; NICKEL OXIDES; TIN  
CHLORIDES; ZINC CHLORIDES; AMMONIUM COMPOUNDS;  
CHLORIDES; COAL PASTES
- 02656 ANNUAL REPORT OF RESEARCH AND  
TECHNOLOGIC WORK ON COAL, FISCAL YEAR 1941.  
Fieldner, A.C.; Schmidt, L.D. U. S. Bur.  
Mines, Information Circ.; 7190: 60p.(1941).  
COAL; PHYSICAL PROPERTIES; CHEMICAL PROPERTIES;  
REVIEWS; HYDROGENATION; CATALYSTS; HYDROCARBONS;  
GASEOUS PRODUCTS; ALUMINIUM OXIDES; MOLYBDENUM  
OXIDES; GASOLINE; PRODUCTION; RESEARCH PROGRAMS
- 02657 COAL HYDROGENATION--NATURAL BITUMINOUS  
COAL; ARTIFICIAL CELLULOSE COAL AND ITS BITUMEN  
AND RESIDUAL PORTION. Berl, E.; Biebesheimer,  
H.; Koerber, W. Ind. Eng. Chem.; 33: 672-  
4(1941).  
At 440 to 500°C and up to 150 atm using iron  
oxide, Fe, and I as catalysts. COAL;  
HYDROGENATION; BITUMINOUS COAL; HIGH PRESSURE;  
IRON OXIDES; IRON; IODINE; CATALYSTS; HIGH

- TEMPERATURE;HYDROCARBONS;PRODUCTION;LIQUID PRODUCTS;GASEOUS PRODUCTS
- 02658 CHANGES IN CATALYSTS USED IN HIGH-PRESSURE HYDROGENATION. Morikawa, K.; Oda, K.; Isikawa, S. Nenryo Kyokai-shi; 20: 599-611(1941).  
CATALYSTS;HIGH PRESSURE;HYDROGENATION;COAL
- 02659 CATALYTIC DESTRUCTIVE HYDROGENATION OF COALS, PEAT, WOOD, OR TARS. (to I. G. Farbenindustrie). British Patent 531,543. 10 Jan 1941.  
Addition of gaseous alkenes before or during reaction. COAL;PEAT;WOOD;TAR;HYDROGENATION;OXIDES;SULFIDES;HALIDES;PHOSPHATES;CATALYSTS;ALKENES;ADDITIVES;HYDROGEN
- 02660 CATALYSTS FOR HEAT-TREATMENT OF COAL, TAR, ETC. Pier, M.; Dinkler, W.; Grassl, G. (to I. G. Farbenindustrie). German(FRG) Patent 703,836. 13 Feb 1941.  
Preparation of catalysts from tin food cans. CATALYSTS;TIN;TIN COMPOUNDS;HYDROGENATION;COAL TAR;COAL;SOLID WASTES;CHEMICAL PREPARATION
- 02661 LIGHTER HYDROCARBONS. Blakemore, B. British Patent 533,715. 19 Feb 1941.  
Coal treated with electrically conductive reducing agent in closed furnace under reduced pressure. BITUMINOUS COAL;COAL;HIGH TEMPERATURE;PRODUCTION;HYDROCARBONS;GASEOUS PRODUCTS;LIQUID PRODUCTS;WATER VAPOR;HYDROGENATION
- 02662 SOLUBLE AND FUSIBLE SOLID BITUMINOUS HYDROCARBONS. Uhde, F.; Pfirrmann, T.W. German(FRG) Patent 705,011. 13 Mar 1941.  
Catalytic hydrogenation at >380°C and high pressure. COAL;HYDROGENATION;HIGH TEMPERATURE;HIGH PRESSURE;CATALYSTS
- 02663 APPARATUS FOR PREHEATING LIQUID CARBONACEOUS MATERIALS SUCH AS COAL-OIL PASTES BEFORE DESTRUCTIVE HYDROGENATION. Schon, E.; Schiwy, A.; Woehner, E. (to Standard Catalytic Co.). US Patent 2,276,883. 17 Mar 1941.  
COAL;HYDROGENATION;CATALYSTS;COAL PASTES;COAL;LABORATORY EQUIPMENT;HEATING
- 02664 CATALYTIC HEAT-TREATMENT OF CARBONACEOUS MATERIALS SUCH AS THOSE FROM HYDROGENATING COAL FOR THE PRODUCTION OF HYDROCARBONS. Anthes, E.; Fuener, W.v.; Simon, W. (to I. G. Farbenindustrie). US Patent 2,278,407. 7 Apr 1941.  
Preparation of metal sulfide catalyst. CARBONACEOUS MATERIALS;HEATING;HIGH TEMPERATURE;CATALYSTS;SULFIDES;COAL;HYDROGENATION;CHEMICAL PREPARATION;HYDROCARBONS;PRODUCTION;AMMONIUM COMPOUNDS;CARBONYLS;TUNGSTATES;NICKEL;IRON;COBALT
- 02665 HYDROGENATION OF COAL, TAR, MINERAL OIL, ETC. Pier, M.; Donath, E. (to I. G. Farbenindustrie). German(FRG) Patent 711,470. 4 Sep 1941.  
Using heavy metal sulfide catalysts with H<sub>2</sub>S added as promoter. COAL;COAL TAR;MINERAL OILS;HYDROGENATION;CATALYSTS;METALS;SULFIDES;HYDROGEN SULFIDES;PROMOTERS
- 02666 HEATING COAL PASTES PRIOR TO THEIR HYDROGENATION. Pier, M.; Schappert, H.; Kronig, W. (to I. G. Farbenind.). German(FRG) Patent 715,988. 11 Dec 1941.  
Coal paste made with oil, tar, or coal extracts. COAL PASTES;HYDROGENATION;HEATING
- 02667 HIGH-PRESSURE HYDROGENATION OF COAL. Rosendahl, F. Chemie und Industrie; 47: 40(1942).  
COAL;HYDROGENATION
- 02668 HYDROGENATION OF COAL PASTE. II. ACTIVITY OF CATALYSTS. Kurokawa, M. J. Soc. Chem. Ind., Japan; 45: 1033-6(1942).  
Comparison of SnO<sub>2</sub>, MoO<sub>3</sub>, and SnCl<sub>2</sub> catalysts. COAL;COAL PASTES;HYDROGENATION;CATALYSTS;TIN OXIDES;MOLYBDENUM OXIDES;MOLYBDENUM SULFIDES;TIN CHLORIDES;COMPARATIVE EVALUATIONS
- 02669 LOW-TEMPERATURE TAR AND OIL: PROPERTIES AND APPLICATIONS. Heinze, R. Gas-Wasserfach; 85: 413-25(1942).  
Processing by distillation, cracking under pressure, hydrogenation under pressure, and solvent extraction with ethanol, SO<sub>2</sub>, or phenol. COAL TAR;COAL TAR OILS;BROWN COAL;HYDROGENATION;CRACKING;SOLVENT EXTRACTION;ETHANOL;SULFUR DIOXIDE;PHENOL;GASOLINE;PRODUCTION;BITUMINOUS COAL;CARBONIZATION;DISTILLATION;COAL
- 02670 HYDROGENATION OF COAL PASTE. I. CHEMICAL CHANGES IN COAL PASTE. Kurokawa, M. J. Soc. Chem. Ind., Japan; 45: 1030-3(1942).  
Classification of catalysts. COAL;COAL PASTES;HYDROGENATION;CATALYSTS
- 02671 HYDROGENATION. (to I.G. Farbenind.). German(FRG) Patent 717,189. 15 Jan 1942.  
Addition of H<sub>2</sub>SO<sub>4</sub>, H<sub>2</sub>SO<sub>3</sub>, or HNO<sub>3</sub> to hydrocarbon oils from coal, tar, mineral oils before or during hydrogenation. HYDROGENATION;COAL;COAL TAR;MINERAL OILS;HIGH TEMPERATURE
- 02672 HYDROGENATION OF HIGH-BOILING COAL DISTILLATES, TAR OILS, ETC. (to Deutsche Hydrierwerke). German(FRG) Patent 718,334. 19 Feb 1942.  
Catalytic hydrogenation at 400 to 550°C; catalysts consists of H-carrying metals combined with halogens that volatilize during reaction. HYDROGENATION;COAL TAR;HIGH TEMPERATURE;CATALYSTS;HALOGENS
- 02673 EFFECT OF COMPOSITION AND RANK OF COAL ON HYDROGENATION. Anon. Oil Gas J.; 41: No. 37, 40-2, 44, 47(1943).  
COAL RANK;HYDROGENATION;COAL;CHEMICAL COMPOSITION
- 02674 HYDROGENATION OF COAL PASTE. V. HYDROGENATION IN THE PRESENCE OF MIXED CATALYSTS. Kurokawa, M. J. Soc. Chem. Ind., Japan; 46: 541-4(1943).  
COAL;COAL PASTES;HYDROGENATION;CATALYSTS; MIXTURES
- 02675 HYDROGENATION OF COAL PASTES. VI. ACTIVITY OF CATALYSTS UNDER HIGH PRESSURE. Kurokawa, M.; Fujiwara, M. J. Soc. Chem. Ind., Japan; 46: 1301-10(1943).  
Using Ni<sub>2</sub>O<sub>3</sub>, MoO<sub>3</sub>, and SnO<sub>2</sub> catalysts. COAL; COAL PASTES;HYDROGENATION;HIGH PRESSURE; PRESSURE DEPENDENCE;CATALYSTS;MOLYBDENUM OXIDES; NICKEL OXIDES;TIN OXIDES
- 02676 HYDROGENATION OF COAL PASTE. VII. EFFECT OF REACTION TEMPERATURE AND REACTION TIME UNDER HIGH PRESSURE. Kurokawa, M.; Fujiwara, M. J. Soc. Chem. Ind., Japan; 46: (1943).  
Using Ni and Mo catalysts at 450 to 500 atm pressure. COAL;COAL PASTES;HYDROGENATION; CATALYSTS;NICKEL;MOLYBDENUM;HIGH TEMPERATURE; HIGH PRESSURE;TEMPERATURE DEPENDENCE;PRESSURE DEPENDENCE;TIME DEPENDENCE
- 02677 HYDROGENATION OF COAL PASTE. VIII. HYDROGENATION OF THE PASTE OF COAL EXTRACT UNDER HIGH PRESSURE. Kurokawa, M.; Fujiwara, M. J. Soc. Chem. Ind., Japan; 46: (1943).  
At 450° and 200 to 700 atm pressure using MoO<sub>3</sub> catalyst. COAL;SOLVENT EXTRACTION;COAL PASTES;HYDROGENATION;HIGH TEMPERATURE;HIGH

- PRESSURE; CATALYSTS; MOLYBDENUM OXIDES
- 02678 HYDROGENATION OF COAL PASTE. III. HYDROGENATION IN THE PRESENCE OF SINGLE CATALYSTS. Kurokawa, M. J. Soc. Chem. Ind., Japan; 46: 535-8(1943).  
Comparison of oxides of Sn, Ni, Mo, Fe, and Pb as catalysts. COAL; COAL PASTES; HYDROGENATION; CATALYSTS; MOLYBDENUM OXIDES; TIN OXIDES; NICKEL OXIDES; IRON OXIDES; LEAD OXIDES; COMPARATIVE EVALUATIONS
- 02679 HYDROGENATION OF COAL PASTE. IV. EFFECT OF THE VARIETIES OF COAL PASTE. Kurokawa, M. J. Soc. Chem. Ind., Japan; 46: 538-41(1943).  
Effects of the paste on activity of oxide and sulfide catalysts. COAL; COAL PASTES; HYDROGENATION; CATALYSTS; OXIDES; CHLORIDES; SULFIDES
- 02680 HYDROGENATION OF COAL AT HIGH TEMPERATURES. Bray, J.L.; Howard, R.E. Purdue Univ., Eng. Expt. Sta. Bull., Research Ser.; No. 90, 55p.(1943).  
400 to 570°C; pressures up to 4500 lb/in<sup>2</sup> no catalysts. COAL; HYDROGENATION; HIGH TEMPERATURE; HIGH PRESSURE
- 02681 HYDROGENATION OF RUMANIAN BROWN COAL. Candea, C.; Kuhn, J. Oel u. Kohle; 39: 58-60(1943).  
Mixture with mineral oil; MoO<sub>3</sub> catalyst. COAL; BROWN COAL; MINERAL OILS; HYDROGENATION; MOLYBDENUM OXIDES; CATALYSTS; HIGH TEMPERATURE; HIGH PRESSURE; GASOLINE; PRODUCTION
- 02682 HYDROGENATION OF BITUMINOUS COAL TARS. Cawley, C.M.; Kingman, F.E.T. Fuel; 22: 156-64(1943).  
200 atm; 450°C; MoS<sub>2</sub> catalyst; HI catalyst with MoO<sub>3</sub>. COAL TAR; HYDROGENATION; BITUMINOUS COAL; HIGH PRESSURE; HIGH TEMPERATURE; CATALYSTS; MOLYBDENUM SULFIDES; HYDRIODIC ACID; MOLYBDENUM OXIDES
- 02683 CATALYTIC HYDROGENATION OF CO-CH<sub>4</sub> SYNTHESIS FROM WATER GAS. Meller, A. Australian Chem. Inst. J. and Proc.; 10: 100-114, 123-9(1943).  
Catalyst consisting of 90 percent Ni and 10 percent Al<sub>2</sub>O<sub>3</sub>. WATER GAS; CATALYSTS; NICKEL; ALUMINUM OXIDES; CARBON MONOXIDE; HYDROGENATION; REDUCTION
- 02684 CATALYST FOR HYDROGENATION OF COAL, TARS, MINERAL OILS, AND THEIR DISTILLATES, EXTRACTS, OR BOTTOMS. (to I. G. Farbenind.). German (FRG) Patent 741,388. 23 Sep 1943.  
Use of organic Cl compounds as catalysts. HYDROGENATION; COAL; COAL TAR; MINERAL OILS; CATALYSTS; ORGANIC CHLORINE COMPOUNDS
- 02685 ACTION OF CHEMICAL REAGENTS ON BITUMINOUS COALS. Thomson, G.H. Brit. Coal Utilization Research Assoc. Bull.; 8: 258-66(1944).  
Review with 86 references. COAL; HYDROGENATION; OXIDATION; HALOGENATION; SOLVENT EXTRACTION; REAGENTS; REVIEWS
- 02686 HYDROGENATION OF COAL PASTE. IX. FITNESS OF JAPANESE COAL FOR LIQUEFACTION. Kurokawa, M.; Fujiwara, M. J. Soc. Chem. Ind., Japan; 47: 537-9(1944).  
Coal pastes. COAL LIQUEFACTION; COAL PASTES
- 02687 AMENABILITY OF COALS TO HYDROGENATION. Booth, N. Fuel; 23: 139-41(1944).  
Correlation between coal composition and ease of hydrogenation. COAL; COAL PASTES; HYDROGENATION; HIGH TEMPERATURE; MEDIUM PRESSURE; GASEOUS PRODUCTS; CHEMICAL COMPOSITION
- 02688 HYDROGENATION OF COAL. Storch, H.H. Ind. Eng. Chem.; 36: 291-9(1944).  
COAL; HYDROGENATION
- 02689 CATALYSIS OF THE LIQUID-PHASE STAGE OF COAL HYDROGENATION. Booth, N. J. Soc. Chem. Ind.; 63: 1-3(1944).  
Tin compounds as catalysts. COAL; HYDROGENATION; CATALYSTS; TIN COMPOUNDS; TIN ALLOYS; IRON ALLOYS; LIQUIDS
- 02690 ANNUAL REPORT OF RESEARCH AND TECHNOLOGIC WORK ON COAL, FISCAL YEAR 1943. Fieldner, A.C.; Beltz, J.C.; Fisher, P.L. U. S. Bur. Mines, Information Circ.; 7272: 58p.(1944).  
USA. COAL; HYDROGENATION; WATER GAS; HYDROCARBONS; PRODUCTION
- 02691 HYDROGENATION OF COAL TAR AND PITCH. Harvey, J.E., Jr. US Patent 2,349,720. 23 May 1944.  
425 and 225 atm pressure using oxide or sulfide of W as catalyst. COAL TAR; HYDROGENATION; PITCHES; HIGH TEMPERATURE; HIGH PRESSURE; TUNGSTEN SULFIDES; TUNGSTEN OXIDES
- 02692 HYDROCARBON SYNTHESIS. Mayr, H.; Marinesco, N. French Patent 893,663. 11 Aug 1944.  
By reduction of CO under influence of ultrasonic waves. CARBON MONOXIDE; REDUCTION; HYDROGEN; PRODUCTION; HYDROCARBONS; MEDIUM PRESSURE; MEDIUM TEMPERATURE; ULTRASONIC WAVES
- 02693 HYDROGENATION AT HIGH PRESSURE IN THE PRODUCTION OF FUELS AND LUBRICANTS. Blasco, E. Ion; 5: 91-7(1945).  
Review on hydrogenation of lignite, coal, and tar. LIGNITE; COAL; COAL TAR; HYDROGENATION; REVIEWS
- 02694 SHALE OIL AND HYDROGENATION OF COAL. Greenwalt, I.M. 18p.(1945).  
18 page booklet. SHALE OIL; COAL; HYDROGENATION; MANUALS
- 02695 SECONDARY HYDROGENATION OF LIQUEFIED COAL OIL AT HIGH PRESSURE. Kurokawa, S.; Fujihara, M. J. Soc. Chem. Ind., Japan; 48: 40-1(1945).  
MoS<sub>3</sub> as catalyst. HYDROGENATION; HIGH TEMPERATURE; HIGH PRESSURE; MOLYBDENUM SULFIDES; CATALYSTS; OILS; COAL
- 02696 EFFECT OF HYDROAROMATIC MIXING OIL AND COMBINED MIXING OIL ON HYDROGENATION OF COAL PASTE. Kurokawa, S. J. Soc. Chem. Ind., Japan; 48: 43-4(1945).  
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