

ceramic alloys 0.2, 0.4, 1.0 and 10% Pd-Ti made in 20% HCl electrolyte at 0.65 V showed that even the small addition of Pd (0.2-1.0%) in the alloys increased their corrosion resistance by one to two times from that of metal ceramic Ti. The best results were achieved on the metal ceramic alloy 10% Pd-Ti anodes in chlorine ion extraction.

TEMPERATURE MEASUREMENT

Balloon-borne Radiosonde for the Measurement of the Atmospheric Thermal Structure Coefficient

R. BARLETTI, P. LEMMETTI and L. PATERNO, *Mater. Sci. Engng.*, 1975, **18**, (1), 157-158

The characteristics and operational limits of a balloon-borne radiosonde with Pt wire temperature sensor working up to 20 km for the measurement of the atmospheric thermal structure coefficient C_T^{-2} are described.

NEW PATENTS

METALS AND ALLOYS

Contact Material

FUJITSU LTD. *U.S. Patent* 3,826,886
A contact material having a high durability is prepared from an alloy consisting of 45-85 at.% Pd and 55-15 at.% Al.

Acoustic Devices Using Amorphous Metal Alloys

ALLIED CHEMICAL CORP. *U.S. Patent* 3,838,365
Amorphous layers for use in acoustic alloys have a wide range of compositions but specifically include Pd_{77.5}Ag₆Si_{16.5}, Pd₇₆Cu₅Si₁₀, etc.

ELECTRODEPOSITION AND SURFACE COATINGS

Electrically Conductive Composition Element

C.T.S. CORP. *U.S. Patent* 3,832,308
An electrically conductive composition is mixed with a screening agent, deposited on a substrate and fired at an elevated temperature to form a terminal bonded to the substrate. The composition is a homogeneous mixture of approximately 70-95% co-precipitated Pt-Au alloy particles, co-precipitated Pd-Au alloy particles or co-precipitated Pt-Pd-Au particles and approximately 5-30% of glass frit.

An Easily Calibrated, Versatile Platinum Resistance Thermometer

T. E. FOSTER, *Hewlett Packard J.*, 1974, **25**, (8), 13-17

Pt resistance wire with a wide range (-250 to +800°C) is used as the sensor for the new thermometer. Unusual features of this digital thermometer are a choice of normal or expanded resolution, linear analogue output, interchangeable probes, and many options including a battery pack and digital output.

Stabilisation of Metal-sheathed Thermocouples

J. E. BARD, *Instrum. Technol.*, 1974, **21**, (10), 50-51
Microanalytical measurements of a 10% Rh-Pt sheathed, magnesia-insulated Pt:13% Rh-Pt thermocouple at a steady 1450°C showed them to drift more than 200°C after 1400 h. Rh from both the sheath and the positive thermoelement (13% Rh-Pt) had migrated to the negative thermoelement (Pt), and this occurred at locations well removed from the hot junction.

LABORATORY APPARATUS AND TECHNIQUE

Alloy Tension Band

FA. CARL HAAS *British Patent* 1,378,835
Tension bonds for measuring instruments are made from alloys containing at least 50% Pd and/or Pt and less than 50% of at least one Group III to VI element (excluding B, C, N, O and the transition elements), e.g. Al, Sb, Te, Sn, Ca. About 1-30% Au, Ag or Cu may also be present. A typical alloy contains 4% Al, 4% Ag, and Pd.

HETEROGENEOUS CATALYSIS

Exhaust Catalyst

W. R. GRACE & CO. *British Patent* 1,374,064
Pd and/or Pt on ceramic monolithic catalyst is improved by the presence of a number of linear and parallel passages for gas flow.

Hydrocarbon Isomerisation Catalyst

UNIVERSAL OIL PRODUCTS CO. *British Patent* 1,374,863
Saturated and unsaturated hydrocarbons may be isomerised over a catalyst containing Pt or another Pt metal, a halide, a reaction product of a Friedel-Crafts metal halide and the Al₂O₃ support, and either a Re component or a germanium component in an oxidation state greater than elementary metal.

Coated Catalyst Material

W. R. GRACE & CO. *British Patent* 1,378,269
Supported Pt, Pd and other metal catalysts having the active metal mostly on the surface of the support are obtained by coating a refractory oxide support with a layer of C, electrolytically depositing the active metal on C from a suitable bath and then destroying the C layer by heating.

Multimetallic Catalyst Composite

UNIVERSAL OIL PRODUCTS CO.
U.S. Patent 3,821,105
A catalytic composite contains Pt or Pd, Ir and a Group IVA metallic component combined with a carrier material containing Al and a finely divided zeolite crystalline aluminosilicate. An example contains 0.01–2% Pt or Pd, 0.01–2% Ir and 0.01–5% Ge, Sn or Pb combined with a Al_2O_3 carrier material having 0.1–20% of the H form of mordenite uniformly distributed through it.

Simultaneously Producing Synthetic Natural Gas and High Octane Reformate

UNIVERSAL OIL PRODUCTS CO.
U.S. Patent 3,825,487
A synthetic natural gas stream and a high octane reformate stream are produced by contacting a hydrocarbon charge stock (boiling in the gasoline range) and H₂ in synthetic natural gas production conditions, with a catalytic composite having a porous carrier material containing 0.01–2% of a Pt group metal, 1–5% Ni and 0.01–5% of a Group IVA metal, e.g. Pt, Ni or Sn on Al_2O_3 .

Reducing the Content of Nitrogen Oxides in the Exhaust Gases

GULF RESEARCH & DEVELOPMENT CO.
U.S. Patent 3,825,654
An exhaust gas is contacted at an elevated temperature in a first zone in a reducing atmosphere with a catalyst, such as Pt, that will convert the NO_x to a product containing NH₃. The resulting gas mixture is contacted at an elevated temperature in a second zone in a reducing atmosphere with Ru or Rh to convert the NH₃ to N₂.

Reforming with Platinum-Lead Catalyst

ASAHI KASEI K.K.K. *U.S. Patent* 3,827,971
Aromatic hydrocarbons are produced by hydroforming a hydrocarbon at a temperature from 300 to 650°C over a catalyst containing Pt and Pb, and prepared by first impregnating a carrier with Pt and then with Pb. See also *U.S. Patent* 3,827,988.

Production of Benzene

IMPERIAL CHEMICAL INDUSTRIES LTD.
U.S. Patent 3,829,519
Alkyl aromatic hydrocarbons, for example toluene, are dealkylated to yield benzene and hydrogen in the presence of steam and optionally hydrogen

over a supported Pt group catalyst. The products of the reaction are phase separated to yield an organic fraction from which benzene is separated, the remainder of the fraction comprising unchanged and/or other aromatic hydrocarbons being recycled as feed material for continued dealkylation.

Reforming Process with Promoted Catalyst

CHEVRON RESEARCH CO. *U.S. Patent* 3,830,727
A naphtha feedstock containing less than about 10 p.p.m. S and less than about 50 p.p.m. water is contacted in reforming conditions and in the presence of H₂ with a porous Al_2O_3 -containing solid carrier supporting 0.01–3% Pt, 0.01–3% Re, 0.01–8% Sn, and 0.1–3% halogen. The catalytic composition is activated prior to the contacting by reacting it with an activating gas including oxygen and a halogenating component at 500–1300°F for at least about 0.5 h.

Preparation of Polynuclear Aromatic Hydrocarbons

UNIVERSAL OIL PRODUCTS CO.
U.S. Patent 3,832,413
Polynuclear aromatic hydrocarbons are prepared by treating a low molecular weight saturated hydrocarbon in the presence of a catalyst comprising Rh-containing compounds such as a Rh/ Al_2O_3 and in the absence of any added or extraneous gas.

Hydroconversion Process

CHEVRON RESEARCH CO. *U.S. Patent* 3,833,499
A hydrocracking process uses a Pd-zeolite-amorphous inorganic oxide catalyst containing 1–40% zeolite. The catalyst is prepared by impregnating Pd into the zeolite, combining the impregnated zeolite with the amorphous inorganic oxide and impregnating at least the amorphous inorganic oxide with Pd. Preferably the catalyst is calcined at 1000–1800°F. The catalyst is found to be especially effective in hydrocracking high ends and point feeds with surprisingly low build up of heavy ends in the recycle stream.

Platinum-Indium-Molybdenum Reforming Catalysts

ESSO RESEARCH & ENGINEERING CO.
U.S. Patent 3,833,516
A catalyst containing Pt, Mo and In on a porous inorganic oxide base is found particularly useful in reforming, especially in reforming highly paraffinic naphthas.

High Severity Reforming Process with a Platinum-Iridium Catalyst

ESSO RESEARCH & ENGINEERING CO.
U.S. Patent 3,834,034
Naphtha feed-stocks are converted to high octane products in high severity conditions using a

catalyst consisting of Al_2O_3 in association with 0.15–0.75% Pt, 0.15–0.45% Ir and 0.3–2.0% Cl. The surface area of the Pt and Ir on the Al_2O_3 is at least 200 m^2/g of Pt and Ir. The catalyst should contain less than about two atoms of S per atom of Pt and Ir and be substantially free of alkali and alkaline earth metal constituents.

Platinum Catalytic Mixture

COLONIAL METALS INC. *U.S. Patent 3,835,066*
A catalytic mixture includes a Pt-based compound, such as chloroplatinic acid or ammonium chloroplatinite, mixed with other constituents, including water. The mixture can be deposited on to pads used in catalytic heaters, for example, and heated to precipitate the Pt on to the pads.

Ruthenium Catalyst System

FORD MOTOR CO. *U.S. Patent 3,835,069*
A ruthenate is presynthesised, ground into a fine powder, dispersed in a $\gamma\text{-Al}_2\text{O}_3$ -containing medium and applied as a slurry to a catalytic support. The ruthenate slurry is dried on the support and calcined. The product produced in this manner is useful in the catalytic conversion in a reducing atmosphere of NO_x .

Platinum Group Metal-containing Isomerisation Catalyst

INSTITUT FRANCAIS DU PETROLE DES CARBURANTS ET LUBRIFIANTS *French Appl. 2,201,924*
A hydrocarbon isomerisation catalyst contains (a) Al_2O_3 support, (b) a polyhydrocarbyloxy or hydrocarbyloxy aromatic compound, (c) a halide and (d) a Group VI or VIII metal or metal compound, especially Pt or Pd.

Catalyst Treatment Process

CIE, FRANCAISE DE RAFFINAGE
French Appl. 2,202,146
A process for regulating the Cl_2 content of a hydrocarbon conversion catalyst with an Al_2O_3 support, Pt and Ge or Re, consists of washing the catalyst, drying, calcining in air, and submitting it to a reducing treatment.

Platinum Group Catalyst for Exhaust Gas Purification

PRO-CATALYSE *French Appl. 2,204,454*
A catalyst consists of a physical mixture of at least 2 granular components, one of which is Al_2O_3 support and the other is one or more Pt group metals, especially Pt, Ir, Pd, and Ru.

Group VIII Metal-Aluminium Isomerisation Catalysts

INSTITUT FRANCAIS DU PETROLE, DES CARBURANTS ET LUBRIFIANTS *French Appl. 2,206,124*
Isomerisation catalysts are prepared by (a) incorporating a Pt metal, e.g. Rh, Pt, Ir or Os, on to a support and (b) treating the support with an organic Al halide.

Catalyst for Exhaust Gas Purification

REGIE NATIONALE DES USINES RENAULT,
AUTOMOBILES PEUGEOT *French Appl. 2,209,603*
The catalyst is prepared by immersing a porous support in an ammoniacal solution containing a Pt group halide and heating the support at 90–110°C for 20 h in the presence of a 30% solution of an organic metal halide reducing agent.

Hydrocarbon Conversion Catalyst

SOCIÉTÉ FRANCAISE DES PRODUITS POUR CATALYSE
French Appl. 2,209,604
A catalyst, especially for reforming hydrocarbons, consists of (a) a porous support, (b) Pt, (c) Ir, and (d) Mn, the contents being 0.005–10% Pt, 0.005–1.0% Ir and 0.005–5.0% Mn (based on the support).

Noble Metal Catalyst for Multigrade Oil Production

INSTITUT FRANCAIS DU PETROLE, DES CARBURANTS ET LUBRIFIANTS *French Appl. 2,209,827*
A noble metal catalyst, e.g. Pt/ Al_2O_3 , is used in the preparation of multigrade oils from a mixture of hydrogen and a paraffin.

Exhaust Gas Catalyst

DEUTSCHE GOLD- & SILBER- SCHEIDEANSTALT
German Offen. 2,306,395
A high efficiency catalyst of favourable ageing behaviour contains Ru, Rh, Pd, and/or Pt, and Cr, Al, Ti, Mn, Co, and/or Ni in a 1:4 to 1:1 ratio, at least three metals being present.

Production of Propionic Acid

KNAPSACK A.G. *German Offen. 2,310,754*
Acrylic acid is hydrogenated to propionic acid using a catalyst in which Pd is present, mainly on the surface of a support.

Exhaust Gas Catalyst

W. C. HERAEUS G.m.b.H. *German Offen. 2,339,338*
ICE exhaust gases are oxidised over a Pt group metal or alloy catalyst deposited on a support coated previously with a boehmite layer.

HOMOGENEOUS CATALYSIS

Carboxylic Acid Esters

MONSANTO CO. *British Patent 1,373,568*
Highly active and selective catalysts for the production of esters from olefins, CO and alcohols are solutions containing a rhodium compound or complex and an organophosphorus component, e.g. Rh carbonyl acetylacetonate and tributyl phosphine.

Acrylic Silanes

GENERAL ELECTRIC CO. *British Patent 1,377,321*
A silane is added to an acetylenic ester of an

acrylic acid in the presence of a complex of H_2PtCl_6 and an alcohol such as octyl alcohol to give an acrylic silane.

Organometallic Platinum Metal Complexes

SNAM PROGETTI S.P.A. *British Patent 1,377,569*
New catalysts for chemical reactions are neutral complexes of formula $[ML_mL'_nA_a]X_x$, where M is Rh, Ir, Ru, Pd, or Pt, L and L' are the same or different olefin ligands, A is a nitrile, phosphine, phosphite, arsine, or stibine ligand, X is an anion, m and n are 0-3, m+n is 1-3, a is 1-3 and x is 1 or 2. The complexes are obtained by reacting a complexed Pt metal halide with a Cu or Ag complex salt. Thus $Rh(C_2H_4)_2Cl_2$ dimer with $Cu(MeCN)_4BF_4$ gives $[Rh(C_2H_4)_3(MeCN)_2]BF_4$.

Production of Aldehydes from Olefins

CELANESE CORP. *U.S. Patent 3,821,311*
A Rh carbonyl complex of a phosphine, arsine or stibine is used with an aldol condensation catalyst to catalyse the conversion of olefins to saturated aldehydes.

Alkylation of Heterocyclic Compounds

UNION OIL CO. OF CALIFORNIA
U.S. Patent 3,825,545
Heterocyclic compounds can be alkylated with an alcohol or an amine as the alkylating agent in the presence of a Pt group metal catalyst which is complexed with a biphilic ligand, e.g. $RuCl_3PPh_3$ complex may catalyse the octylation of quinoline.

Hydroformylation of Internal Olefins

SUN OIL CO. *U.S. Patent 3,825,601*
Hydroformylation of internal olefins to produce linear aldehydes in improved yields is achieved by the addition of a sulphonic acid-type ion exchange resin to a catalyst of formula $Rh(H)(CO)(Ph_3P)_3$.

Homogeneous Catalysts for the Reduction of Nitroaromatics to Amines

TEXACO INC. *U.S. Patent 3,832,401*
Homogeneous Ru and Fe catalyst complexes, preferably stabilised by a displaceable ligand such as triphenylphosphine, and/or solubilised by a solvating agent such as a lower alkanol, are used as reducing agents in the presence of a non-aqueous, non-oxidising reaction medium, at reaction temperatures of 35-160°C and elevated pressures, in a substantially H atmosphere, to reduce at least one nitro group of nitroaromatics to the corresponding aromatic amine.

Manufacture of Polyfunctional Compounds

UNION CARBIDE CORP. *U.S. Patent 3,833,634*
Polyfunctional O-containing compounds such as ethylene glycol and/or its derivatives are prepared by reacting an oxide of carbon with hydrogen using a Rh complex catalyst.

Dialdehyde Production

B.A.S.F. A.G. *German Offen. 2,317,625*
Dialdehydes or their acetals are produced by the carbonylation of dienes in the presence of a Rh complex containing carbonyl phosphine or phosphite and halogen ligands, e.g. $ClRhCO(PPh_3)_2$.

GLASS TECHNOLOGY

Spinnerets

OWENS-CORNING FIBERGLAS CORP.
British Patent 1,380,854
Pt metal spinnerets are attached to a trough unit which has means to freeze off the glass so that spinnerets may be repaired, etc.

ELECTRICAL AND ELECTRONIC ENGINEERING

Platinum Patterns on Semiconductors

PHILIPS ELECTRONIC & ASSOCIATED INDUSTRIES LTD.
British Patent 1,372,459
A semiconductor is supplied with a pattern of Ge or other material able to react with Pt. Pt is then applied over the whole surface and reacted with the pattern, forming an alloy easier to etch than Pt.

Electrodes for an Electrolysis Cell

ORONZIO DE NORA IMPIANTI ELETTOCHIMICI S.P.A.
British Patent 1,374,183
An electrolysis cell has a permeable metal anode and a similar cathode made from a series of fingers side by side. The anode fingers may be Ti mesh coated with a Pt group metal or oxide, e.g. RuO_2 .

Semiconductor Device

MATSUSHITA ELECTRONICS CORP.
British Patent 1,379,011
A semiconductor device is made by coating Pt on a silicon substrate, heating to bond Pt to the substrate, plating the Pt with Ni, and then heating the Ni to cause Pt to diffuse into the silicon.

TEMPERATURE MEASUREMENT

Sheathed Thermocouple

JOHNSON MATTHEY & CO. LTD.
U.S. Patent 3,821,030
A hermetically sealed metal sheathed thermocouple is insulated with magnesia or beryllia, and air or other oxidising medium is removed from the sheath before sealing. Thus a 30% Rh-70% Pt leg and a 6% Rh-94% Pt leg may be insulated with magnesia and sealed in a 5% Rh-95% Pt sheath from which air has been evacuated. Migration of the Rh as its volatile oxide is thus prevented.