

ANODIC PROTECTION

Anodic Protection of Carbon Steel in Sulphuric Acid

W. P. BANKS and J. D. SUDBURY, *Corrosion*, 1963, **19**, (9), 300T-307T

Pt cathodes were used in tests on 1020-type mild steel samples. The tests showed that the effectiveness of anodic protection and the current density for maintaining protection depended on acid concentration and temperature. H_2SO_4 varied from 45 to 105% concentration and temperature from 80 to 535°F. Graphs illustrate the large increase in current density required with higher temperatures.

ELECTRICAL ENGINEERING

Effect of Organic Vapours on Contact Materials in Communication Engineering

J. TLAMSA and J. NUSZBERGER, *Nachrichtentechnik*, 1963, **13**, (7), 272-277

Ag and Pd contacts were tested for the effects of organic vapours arising from the atmosphere around them or from wire sheathing materials. The vapours can cause sparking, deposits, erosion and changes of resistance. Results are tabulated and cover most of the more common organic materials likely to be present. The activities of contacts in various surroundings are also listed.

NEW PATENTS

Production of Semi-Conductor Devices

THE INTERNATIONAL NICKEL CO. (MOND) LTD. *British Patent* 930,091

An electrically conducting joint is made between a wire and a metal layer adherent to a semi-conductor material with the use of a paste-like dispersion of a metal powder in a liquid vehicle consisting of a thermally decomposable compound. Pt metal and a decomposable Pt compound is used.

Catalytic Decomposition of Hydrazine

ENGELHARD INDUSTRIES INC. *British Patent* 930,499

Hydrazine is contacted with a catalyst composed of one or more of Rh, Ir, Ru and Pd, with, if desired, Pt.

Preparation of 20-Alkylamine Steroid Derivatives

SMITH KLINE & FRENCH LABORATORIES. *British Patent*, 930,676

A Pt oxide hydrogenation catalyst is used in the preparation of the above substances.

Isomerisation of Olefinic Hydrocarbons

BRITISH PETROLEUM CO. LTD. *British Patent* 931,922

The isomerisation of an olefine is carried out using as catalyst a compound of the olefine with a halide of a Pt group metal.

Preparation of Cyanoalkyl Chlorosilanes

GENERAL ELECTRIC CO. *British Patent* 932,380

Relates to a method of forming alpha-cyanoethyl methyl dichlorosilane which comprises reacting methyl dichlorosilane with acrylonitrile in the presence of a catalyst composition comprising palladous chloride, a trialkylamine and a polyamine.

Isomerisation of Olefines

BRITISH PETROLEUM CO. LTD. *British Patent* 932,748

The isomerisation of a branched chain olefine is carried out using as catalyst a complex of the olefine with a halide of a platinum group metal.

Electrolytic Apparatus

D. J. EVANS (RESEARCH) LTD. *British Patent* 932,945

Provides an improved closed electrolytic cell for the production of chlorine by the electrolysis of brine. Electrodes consist of thin sheets of Ti coated with Pt.

Reforming Catalyst

THE STANDARD OIL CO. *British Patent* 934,080

A hydroforming catalyst comprises Pt/ Al_2O_3 in which at least 40% by wt. of the Pt is maintained in an HF-soluble form.

Selective Hydrogenation

FARBENFABRIKEN BAYER A.G. *British Patent* 934,429

Process for the selective hydrogenation of acetylene/diolefine components of a liquid hydrocarbon mixture comprises trickling the hydrocarbon mixture over a Pt or Pd hydrogenation catalyst carried on a macroporous support.

Ignition Device

ROLLS-ROYCE LTD. *British Patent* 934,499

Ignition device for combustion equipment comprises a mass of refractory material and a foraminated catalytic element of Pt, or Rh, or a Pt alloy of less than 0.030 in. thick.

Fuel Cells

LEESONA CORP. *British Patent* 935,430

Provides a fuel cell constructed for high temperature operation in which at least one electrode is composed of a mixture of zinc oxide and

metallic Ag, the gas interface of the electrode being coated with Al silicate or alumina activated with an activating metal, e.g. Pd, Pt or Rh.

Removal of Methane

ENGELHARD INDUSTRIES INC. *British Patent* 935,951
Process for removing methane or oxygen from a gaseous mixture comprises adding oxygen or methane respectively to the gaseous mixture to form a stoichiometric excess, and passing the resultant mixture over a Pt group metal catalyst to effect combustion.

Metal-Loaded Molecular Sieves

UNION CARBIDE CORP. *British Patent* 937,748, 937,749, 937,750

All relate to metal-loaded molecular sieves suitable for use as catalysts, scavengers, getters and the like, the sieves being loaded with one or more of the Pt group metals.

Hydrogenation Cyclisation Catalyst

MINNESOTA MINING & MANUFACTURING CO. *U.S. Patent* 3,095,423

Succinonitrile is catalytically hydrogenated and cyclised simultaneously to 2-pyrrolidone by heating in an aqueous medium at 20–200°C in the presence of a Ru or Pt oxide catalyst.

Fuel Cell Electrode

AIR PRODUCTS & CHEMICALS INC. *U.S. Patent* 3,097,974

The electrode is produced by forming a suspension of active C powder impregnated with Pt or Pd and depositing the suspension in the pores of an electrode matrix made from Ni, Ag, Fe, etc.

Platinum Composite Hydrocracking Catalyst

SOCONY MOBIL OIL CO. *U.S. Patent* 3,098,030

A high boiling petroleum hydrocarbon or hydrocarbon mixture is cracked in the presence of hydrogen using a physical particle-form mixture of (1) a Mo oxide combined with an acidic component of two or more oxides of Groups IIA, IIIB, IVA and VIB and (2) an inert support containing 0.05–10 wt. % of a Pt metal.

Catalytic Removal of Oxygen from Mixtures Containing Nitric Oxide

ENGELHARD INDUSTRIES INC. *U.S. Patent* 3,098,712

A Pt or Rh catalyst, e.g. supported on alumina, may be used to strip oxygen from mixtures containing oxygen and nitric oxide, and optionally other gases, when hydrogen is added to the mixture before passing over the catalyst. This keeps down the catalyst operating temperature.

Fuel Cell Electrode

U.S. SECRETARY OF ARMY. *U.S. Patent* 3,098,772

A platinised carbon electrode specifically for use with acid electrolytes is produced by firing a

known carbon electrode in an atmosphere of carbon dioxide at 800°C, wet proofing the fired electrode in the usual way and then impregnating it with chloroplatinic acid containing 90 mg/ml Pt so that the electrode contains 2 mg Pt per sq. m. of electrode.

Thin Film Noble Metal Thermocouple

ENGELHARD INDUSTRIES INC. *U.S. Patent* 3,099,575

New thermocouples consist of thin films of electrically dissimilar noble metals bonded to a refractory support and connected together, one of these films comprising at least one of Pt, Pd, Rh and Ir, and the other film of at least two of Pd, Rh and Ir, the films being produced by applying the finely divided metals in an organic liquid carrier vehicle. In an example, one film consists of Pt metal and the other of 90% Pt and 10% Rh.

Hydrocracking Catalyst

PHILLIPS PETROLEUM CO. *U.S. Patent* 3,099,618

High sulphur petroleum oils are cracked at lower temperatures with less coke formation by using a Pt-activated Co-molybdate catalyst containing 1–3 wt. % Pt, 1–10 wt. % Co and 1–20 wt. % Mo on a suitable support.

Anode Assembly for Cathodic Protection

CHEMIONICS ENGINEERING LABORATORIES INC. *U.S. Patent* 3,101,311

In providing cathodic protection with an impressed current, the anode is an assembly consisting of a Pt disc of foil thickness in a suitable holder, the foil having a grid-like pattern on its surface to facilitate the release of gaseous electrolysis products.

Catalytic Production of Hydrocyanic Acid

IMPERIAL CHEMICAL INDUSTRIES LTD. *U.S. Patent* 3,102,001

The reaction of the NH₃, a hydrocarbon and oxygen over a Pt metal or alloy is improved by adding 1–500 mg/m³ of S and controlling the oxygen content to give maximum conversion of the NH₃. In No. 3,102,269 the catalyst is specifically claimed and consists of a Pt metal or alloy in massive form, such as one or more layers of metal gauze. At least 50% Pt must be present, as in an alloy of 90% Pt and 10% Rh.

Brine Purification Cathode

IMPERIAL CHEMICAL INDUSTRIES LTD. *U.S. Patent* 3,102,085

Brine containing free and available chlorine is purified by passing it through an electrolytic diaphragm cell having a cathode not attacked by Cl₂, e.g. a Pt-coated Ti electrode.

Platinum Cathode for Titanium Protection

IMPERIAL CHEMICAL INDUSTRIES LTD. *U.S. Patent* 3,102,086

When Ti and its alloys are exposed to corrosion by

strong acids, they are protected by immersing in the acid a Pt/C electrode and impressing a current on the system.

Sulphur-resistant Hydrogenation Catalyst

THE STANDARD OIL CO. *U.S. Patent* 3,102,864

Catalysts suitable for a variety of feedstocks where the fatty substance, olefine, etc., contains S consist of an alumina support impregnated with 0.05-1% of Pt and 0.05-6% of thiocyanate ion and optionally also a small amount of halogen.

Catalytic Hydrogenation of Nitrosamine

E. I. DU PONT DE NEMOURS & CO. *U.S. Patent* 3,102,887

Unsymmetrical disubstituted hydrazines are produced by the catalytic hydrogenation of the corresponding nitrosamine using a Pt metal catalyst, as hitherto, but now hydrogenation, e.g. with Pd/C, is carried out in a solution of ionic strength of at least 0.6 to improve the yields.

Complexed Platinum Metal Hydrogenation Catalyst

SHELL OIL CO. *U.S. Patent* 3,102,899

The Pt metals are amongst the transition metals which may be complexed with trihydrocarbon phosphites, arsenites and stibenites to provide new hydrogenation catalyst, etc.

Fuel Cell Reduction System

IONICS INC. *U.S. Patent* 3,103,473

Fuel cell producing the electrochemical reduction of organic and inorganic compounds has a 'permanent' electrode for the fuel and this contains a Pt metal as catalyst. In No. 3,103,474 the same invention is applied to the recovery of metals, e.g. Cu, Fe, Zn, Cr, Ni, Mn, Co, or Cd, by the reduction of solutions of their compounds.

Reduction Catalyst for Organometallic Compounds

ETHYL CORP. *U.S. Patent* 3,103,525

Zerovalent aryl cyclopentadienyl compounds of the iron subgroup (Mn, Tc, Rh, Fe, Ru, Os) are produced by the reduction of the corresponding halide by hydrogen over Pt, Pd, etc.

Palladium and/or Platinum Reformation Catalyst

THE STANDARD OIL CO. *Dutch Patent* 234,680

A new Pt and/or Pd supported catalyst containing 0.1-10 wt.% Ge is produced by impregnating the support with one or more Pt or Pd compounds and at least one Ge compound and reducing the product.

Catalyst for Hydrogen Cyanide Production

IMPERIAL CHEMICAL INDUSTRIES LTD. *French Patent* 80,273. *Addition to* 1,248,895.

The reaction of NH₃, a hydrocarbon(s) such as

methane and oxygen is catalysed on a high temperature plate made of an alloy of 90% Pt and approximately 10% Rh.

Fritted Platinum Surface Coatings

INTERNATIONAL NICKEL CO. (MOND) LTD. *French Patent* 1,320,963

Pt-coated metal and refractory surfaces, particularly for use in contact with molten glass and enamels, are produced by applying a dispersion of flake Pt metal in a liquid medium, capable of being volatilised or destroyed, and then heating the coated surface to remove the dispersion medium and sintering or fritting the resulting layer of Pt metal flakes. Typically Pt coatings can be produced on alumina in this way.

Catalyst for the Reduction of Mononitro Aromatic Compounds

GENERAL ANILINE AND FILM CORP. *French Patent* 1,321,689

Mononitro ethers are reduced to the corresponding amines with hydrogen in the liquid phase using a noble metal catalyst having a surface of at least about 150 sq. m/g at a temperature of 25-125°C with the reaction water held in dispersion. Suitable catalysts are Pd/C or Pt/Al₂O₃.

Activation of Platinum Metal-Alumina Catalysts

TEXACO DEVELOPMENT CORPORATION. *French Patent* 1,322,457

The activity of catalysts containing a Pt metal used for hydrocarbon isomerisation is increased by contacting them with an activating chloride (e.g. a chloroalkane or an organic chloro acid) having a Cl : C atom ratio of at least 2 : 1 at a temperature between 149 and 345°C. Typical activating compounds are CCl₄, CH₂Cl and trichloroacetic acid chloride.

Oxidation of a Palladium or Platinum Group Metal

SHELL INTERNATIONAL RESEARCH MAATSCHAPPIJ N.V. *French Patent* 1,325,696

Metallic Pd, Pt, Rh, Ru, Os or Ir or a lower valency compound thereof is oxidised in a non-aqueous medium by a gas containing oxygen in the presence of one or more carboxylic acids, one or more other acids and one or more metal oxidation promoters. The carboxylic acid preferably provides the oxidation medium. This process is particularly intended for reoxidising Pd compounds produced when the higher Pd compounds are reduced in producing alkenyl esters of carboxylic acids.

Duplex Chemical Plating

ENGELHARD INDUSTRIES INC. *French Patent* 1,326,441

New economic form of the noble metal-plated deposit required for printed circuit manufacture

consists of a layer of Pt, Rh, Pd or Ru covered with a thin layer of Au, instead of the wholly Au layer previously employed. Normal chemical plating methods are used.

Fusion Production of Platinum

COMPTOIR LYON-ALEMAND, LOUYOT & CIE. *French Patent 1,326,597*

Pt, Rh and similar metals are produced by first pyrolysing a compound to yield a sponge or foam, as hitherto, which is then degassed by heating to a temperature just below its melting point, compressed, melted in a vacuum and cast to give articles such as spinnerets which come into contact with molten glass.

Gold-Palladium Brazing Alloy

AEROJET-GENERAL CORP. *French Patent 1,326,619*

Brazing alloys which require less critical conditions consist of 1-96% Au, 1-72% Pd and 2-61% of Ni, Co and/or Cr, e.g. 45-35% Au, 30-20% Pd, 40-30% Ni and 0-10% Cr.

Electroless Metallising of Powdered Metal Oxides and/or Sulphides

SHERRITT GORDON MINES LTD. *German Patent 1,143,372*

In the electroless metallising of difficult-to-melt powdered metal oxides, and/or sulphides, by dispersion of the previously activated powder in a metallic salt solution under reducing conditions, the powder is treated in an ammoniacal metal salt solution of Os, Rh, Ru, Pt or Pd with reducing gases under a partial pressure of over 4 atm at a temperature above 90°C. See also No. 1,143,373 for similar treatment of powdered carbides, borides, silicides or nitrides.

Electrodeposition of Thick Stress Free Platinum Coating

SEL-REX CORP. *German Patent 1,144,074*

A plating bath for depositing thick stress-free Pt coatings comprises an aqueous solution of platinum-diamino-nitrite, in amount corresponding to a Pt content of at least 6 g/l in sulphamic acid.

Process for Production of Highly Active Metal Catalysts from Laminar Silicates

VEB FARBENFABRIKEN WOLFEN. *German Patent 1,144,696*

Barium phyllosilicate, BaSi_2O_5 or sodium phyllosilicate $\text{Na}_2\text{Si}_2\text{O}_5$ is treated with a salt solution of catalytically active metals at normal pressure or in an autoclave and the metal laminar silicate so formed is, after separation, reduced. The treating solution may be a solution of bivalent salts of e.g. Pd or Pt.

Reforming Catalyst

THE STANDARD OIL CO. *German Patent 1,151,082*

A new reforming catalyst consists of Ge and Pt and/or Pd deposited on a support. Preferably the

Pt and/or Pd represents 5 to 95% of the mixture with Ge. The mixture is said to be a solid solution and is 0.1 to 10 wt.% of the total weight of the catalyst and support together.

Catalyst for Methane Production

ENGELHARD INDUSTRIES LTD. *German Patent 1,151,247*

Catalyst giving low ignition temperatures (e.g. of the order of 271-400°C) for mixtures lean in CH_4 and O_2 consists of Rh, or Rh and another Pt metal, on a support, preferably activated alumina.

Gold-platinum Alloy for Tensioning Strips

W. C. HERAEUS G.M.B.H. *German Patent 1,151,944*

An alloy consisting of 1-50%, preferably 1-30%, of one or more Pt metals, particularly Pt and Rh and/or 1-50%, preferably 5-40%, of one or more of the metals Fe, Co and Ni, remainder at least 20% Au, is used as material for making tensioning strips in measuring instruments with rotating measuring parts.

Catalyst for Benzyl Chloride Amination

SHELL INTERNATIONALE RESEARCH MAATSCHAPPIJ N.V. *German Patent 1,152,098*

2,6-Dichlorobenzonitrile is produced from 2,6-dichlorobenzyl chloride or 2,6-dichlorobenzal chloride by reaction at 150-500°C with a mixture of ammonia and oxygen in the presence of a Pt metal catalyst on a C support, e.g. palladised animal charcoal.

Platinum Metal Alloy for Tensioning Strips

W. C. HERAEUS G.M.B.H. *German Patent 1,152,826*

An alloy for making tensioning strips for precision instruments consists of 1-50%, preferably 5-40%, of one or more of Fe, Co, Ni, W, Mo, Cu or Ag with the remainder Pt, Pd and/or Rh with a minimum of 15% Fe group metal in the case of binary alloys. Optionally part of the three Pt metals may be replaced by other Pt metals, particularly Ir.

Catalytic Olefine Oxidation

FARBWERKE HOECHST A.G. *German Patent 1,153,008*

Aldehydes and/or ketones are produced from olefines by oxidation in the presence of a solution containing a Pt metal salt in a new process in which the amount of oxygen allowed to come into contact with the catalyst is strictly limited.

Separation of Palladium from Other Platinum Metals

CANADIAN COPPER REFINERS LTD. *German Patent 1,153,737*

A solution of Pt metals in HCl, HNO_3 or H_2SO_4 is treated with SO_2 to give an SO_3 content of 0.3-4 g/l and then a soluble iodide is added in stoichiometric amount to precipitate Pd quantitatively by itself as PdI_2 .