

pared by mixing Pt black with a dispersion of PTFE and applying it to a metal screen before drying and curing at 300°C consists of porous aggregates of Pt intermingled with PTFE. Performance is very dependent on microstructure. Whereas hydrophilic electrodes become flooded with electrolyte hydrophobic electrodes become full of gas and the whole thickness of the electrode is effective. The effect of catalyst surface area was studied using graphite powder as the catalyst.

## CHEMICAL TECHNOLOGY

### The Separation of Hydrogen from Ammonia Synthesis Exhaust Gases by the Method of Diffusion through Palladium

YU. K. BAICHTOK, M. B. AIZENBUD, V. A. KURKOVSKII, A. S. FURMANOV, I. YA. AZBEL' and Z. V. KORBUTOVA, *Khim. Promyshlennost'*, 1968, (10), 744-746

NH<sub>3</sub> synthesis is more economic when H<sub>2</sub> in the exhaust gas is purified and when Ar is recovered. Tests on such gas and on pure N<sub>2</sub>-H<sub>2</sub> mixtures compared pure Pd and 5% Ni-10% Ag-Pd foils for H<sub>2</sub> purification by diffusion at 400 and 500°C. Both gas mixtures gave similar results. Ag dusted on Pd foil activated the latter for H<sub>2</sub> diffusion.

## TEMPERATURE MEASUREMENT

### The Effect of Stress on the Thermal EMF of Platinum-Platinum/13% Rhodium Thermocouples

E. S. MORGAN, *Br. J. appl. Phys., J. Phys. D*, 1968, 1, (11), 1421-1429

Variations in thermal e.m.f. with stress of Pt and 13% Rh-Pt wires with junctions at 20 and 550°C are -47 and -12 pV deg C<sup>-1</sup>kg<sup>-1</sup>cm<sup>-2</sup> respec-

tively. The thermal e.m.f. hysteresis loop of some metal-sheathed mineral-insulated thermocouples is explained; the maximum discrepancy from this loop is 23μV at 550°C by calculation, 14μV by experiment on a single thermocouple. Mechanical hysteresis of the loop may cause fracture. A reliable thermocouple of this type needs matching expansion coefficients of sheath and thermocouple.

### Comparison of Platinum Resistance Thermometers between 63K and 373.15K. Part I. Part II

M. R. M. MOUSSA, H. VAN DIJK and M. DURIEUX, *Physica*, 1968, 40, (1), 33-48, 49-60

Twelve Pt resistance thermometers were compared with a reference one at 63-273.15°K and at 373.15°K using a constant temperature bath with the thermometers inserted in a Cu block immersed in liquid iso-C<sub>5</sub>H<sub>12</sub>, C<sub>3</sub>H<sub>8</sub>, O<sub>2</sub>, or N<sub>2</sub> and the differences of the reduced resistances  $W = R(t)/R(0^\circ\text{C})$  of them were determined. The number of calibration points to determine the W-T relation was studied and discussed.

### A Direct-reading Bridge for a Platinum Resistance Thermometer

C. W. VAN DER WAL and L. C. E. STRUIK, *J. sci. Instrum., J. Phys. E*, 1969, 2, (2), 143-145

A Wheatstone bridge for a Pt resistance thermometer was modified so that the angle of rotation of a linear potentiometer is proportional to the temperature with bridge sensitivity fairly independent of temperature. Although not intended for high precision thermometry, irrespective of the inaccuracy of the thermometer itself the reading accuracy is to better than ±0.1 deg C at 0-500°C and the bridge can be used for both temperature control and temperature measurement.

## NEW PATENTS

### METALS AND ALLOYS

#### Methods of Improving the Mechanical Properties of Metals and their Alloys

JOHNSON MATTHEY & CO. LTD  
*British Patent* 1,134,492

Pt metal alloy articles are given greater strength by cold working and annealing to give oriented recrystallisation.

#### Improvements in and Relating to the Treatment of Platinum Group Metals and Alloys

JOHNSON MATTHEY & CO. LTD  
*British Patent* 1,139,897

An alloy having properties of oxidation resistance and high mechanical strength is made by alloying

Pd with a minor amount of Cr capable of forming a stable refractory compound or alloying Rh or Pt (or Rh, Pt with another Pt-metal) with a minor amount of an element capable of forming a stable refractory compound (the element may be Be, Mg, Al, Si, Th, U or a transition metal) and heating (1000°C) the alloy in a gas (e.g. air or O<sub>2</sub>) to form the refractory compound (e.g. oxide) in the alloy.

## CHEMICAL COMPOUNDS

### New Chemical Compounds

IMPERIAL CHEMICAL INDUSTRIES LTD  
*British Patent* 1,138,867

These new chemical compounds are Pt group

metal alkyl carbonyl halides of formula R. M. COX, where R is alkyl, X is halogen and M is Group VIII noble metal, e.g. C<sub>5</sub>H<sub>17</sub>Pt.COCl. They are made by reacting MX with HCOOH and an olefine. No uses are given for the products.

### Osmium Carbonyl

JOHNSON MATTHEY & CO. LTD  
*British Patent 1,140,616*

Os carbonyls are prepared by heating (110–175°C) a solution of OsO<sub>4</sub> in a hydrocarbon solvent (e.g. xylene) inert to OsO<sub>4</sub> under super-atmospheric pressure (10–300 atm) in the presence of CO. The method yields Os<sub>3</sub>(CO)<sub>12</sub> and Os oxy-carbonyl.

## ELECTROCHEMISTRY

### Method of Producing a Platinum Group Metal or Alloy Electrode

AJINOMOTO CO. INC. *British Patent 1,134,620*  
Better Pt group metal plating adherence to clean surfaces, such as Ti surfaces, is obtained by first electroplating to deposit an alloy of a Pt group metal(s) and non-Pt group metal(s) and then dissolving out the latter from the plated coating. The final Pt alloy or Pt group metal is then electroplated on to the surface.

### Production of Gases by the Electrolysis of Water

ALLIS-CHALMERS MFG CO.  
*British Patent 1,139,614*

H<sub>2</sub> and O<sub>2</sub> are generated electrolytically at porous electrodes and diffused into separate chambers. The aqueous electrolyte saturates an electrolyte matrix and fresh electrolyte is passed through only one of the gas chambers. The gas in the other chamber is maintained at sufficient pressure to prevent inward leakage of electrolyte. The H<sub>2</sub>-generating electrode may be coated with a catalytic deposit of Pt, Ir, Pd, Rh, Ru or Os.

### Electrolysis of Alkali Chloride by Mercury-Method

ASAHI KASEI K.K.K. *U.S. Patent 3,409,533*  
Aqueous alkali chloride is electrolysed in a cell using a Pt-plated Ti anode and Hg cathode and operates at specified voltage, current-density and efficiency.

### Electrochemical Cell for Separation of Gaseous Mixture

ALLIS-CHALMERS MFG CO.  
*U.S. Patent 3,410,783*

An electrochemically activable gas is separated from electrochemically inert gases by electrochemical reduction of the former to a solvated species at an activation electrode (porous Ag), transported through the electrolyte to the regeneration electrode (e.g. a Pt/Pd catalysed porous Ni electrode) and regenerated.

### Vacuum-metallised Electrode

NATIONAL RESEARCH CORP.  
*U.S. Patent 3,410,785*

A Ti electrode for electrochemical systems is vacuum coated with Pt <0.0001 inch in thickness. This affords high resistance to flaking upon reversal of electric current in the electrochemical system.

## ELECTRODEPOSITION AND SURFACE COATINGS

### Ceramic Pigments

JOHNSON MATTHEY & CO. LTD  
*British Patent 1,135,957*

A grey ceramic pigment for ceramic, glass and enamelled metal decoration contains elementary Ru, preferably mixed with a suitable carrier.

### Platinum Coating Process and Platinum Coated Materials

JOHNSON MATTHEY & CO. LTD  
*British Patent 1,135,514*

Catalytically active adherent Pt or combinations of at least 50 wt% Pt with other Pt group metals are deposited, especially on fuel cell electrodes, by forming a dispersion of the relevant oxide or oxides of Pt group metals in a 2–5 C aliphatic alcohol. The oxides can be precipitated on the surface to be coated by adding a H<sub>2</sub>O-soluble inorganic salt to the dispersion. The platinised substrate is then processed in the usual way.

## JOINING

### Brazing Alloy for Joining Graphite to Graphite and to Refractory Metals

U.S. ATOMIC ENERGY COMMISSION  
*British Patent 1,133,309*

Graphite is joined to graphite or to Mo, W or their alloys using a brazing alloy containing 30–45 wt% Ni, 43–68 wt% Pd and 2–12 wt% Cr.

### High Temperature Brazing Alloys for Tungsten and Tantalum

U.S. ATOMIC ENERGY COMMISSION  
*British Patent 1,136,980*

The alloy comprises 35–45 wt% Ir and 65–55 wt% W, optionally with 1–10 wt% of the W replaced by Re.

## HETEROGENEOUS CATALYSIS

### Selective Hydrogenation of Small Amounts of Acetylene in Ethylene of Gases Rich in Ethylene

BADISCHE ANILIN-& SODA-FABRIK A.G.  
*British Patent 1,133,253*

The catalyst contains 0.01–1.0 wt% PdSiO<sub>2</sub> having an internal surface area of 250–400 m<sup>2</sup>/g.

### Simultaneous Preparation of Saturated Aliphatic Hydrocarbons Containing 1-4 C Atoms and Benzene with its Homologues from Light Virgin Naphtha

STAMICARBON N.V. *British Patent* 1,133,263

This process is catalysed by a dehydrogenation catalyst comprising 0.1-2% Pt on  $\text{Al}_2\text{O}_3$  and/or  $\text{SiO}_2$ .

### Preparation of Dinitriles from Acrylonitrile

E. I. DU PONT DE NEMOURS & CO.

*British Patent* 1,133,900

The acrylonitrile is heated at 100-200°C and 3.5-635 Kg/cm<sup>2</sup> in the presence of metallic Ru, and gaseous  $\text{H}_2$ .

### Hydrocatalytic Conversion of Hydrocarbons

BRITISH PETROLEUM CO. LTD

*British Patent* 1,134,014

The selective hydrocracking of *n*-paraffins is catalysed by a Group VI or VIII metal or oxide deposited on a decationised mordenite having a  $\text{SiO}_2 : \text{Al}_2\text{O}_3$  ratio of 14 : 1. Pt is a suitable metal.

### Catalysts

JOHNSON MATTHEY & CO. LTD

*British Patent* 1,134,111

Catalysts for oxidation, reduction and other chemical reactions are intimate homogeneous mixtures (not pure mechanical mixtures) of one or more oxides of a Pt metal (excluding Os) and one or more oxides of Fe, Co, Ni and Cu.

### A Process for Starting up a Reactor for the Catalytic Conversion of Hydrocarbons or a Hydrocarbon Mixture

SHELL INTERNATIONAL RESEARCH MIJ. N.V.

*British Patent* 1,134,144

A process for starting up a reactor containing a catalyst comprising Pt and halogen for the catalytic conversion of hydrocarbons or a hydrocarbon mixture, in which a fresh catalyst or a catalyst regenerated with the aid of  $\text{O}_2$ , steam and halogen (the Pt being present on the catalyst as a Pt-halogen compound or complex) is first dried by means of a preferably previously dried oxidative gas or gas mixture at a temperature of at least 480°C and at most 570°C till the  $\text{H}_2\text{O}$  content of the reactor off-gas is less than 150 ppmv. The catalyst, whether in the presence of the hydrocarbon feed to be converted or not, is subsequently reduced by means of dry  $\text{H}_2$  at a temperature of 500°C.

### Process for Reducing the Polymerisation and/or Condensation Tendency of Unsaturated Benzenes Rich in Aromatic Substances

VEB LEUNA-WERKE WALTER ULBRICHT

*British Patent* 1,134,599

Petrol fractions are stabilised by hydrogenation

using a noble metal catalyst, such as Pd, deposited on a mixture of gibbsite and 1-20% kaolin which has a surface area of more than 150 m<sup>2</sup>/g.

### Fluoropyridines

NATIONAL RESEARCH DEVELOPMENT CORP.

*British Patent* 1,134,651

Trifluoro- or tetrafluoropyridines can be obtained by hydrogenating chlorofluoropyridines, e.g. using PdC as catalyst.

### Paraffinic Jet Fuel by Hydrocracking Wax

ESSO RESEARCH & ENGINEERING CO.

*British Patent* 1,137,639

Jet fuel is produced by cracking a paraffinic wax feedstock over a catalyst, such as Pd on a zeolite, at 300-900°F, 500-3000 psig and 0.1-10 v/v/h with added  $\text{H}_2$ .

### Preparation of Dicarboxylic Acids

E. I. DU PONT DE NEMOURS & CO.

*British Patent* 1,138,131

Cyclic olefines are oxidised to dicarboxylic acids by  $\text{HNO}_3$  in the presence of an Os-V catalyst, e.g. in  $\text{OsO}_4\text{-V}_2\text{O}_5$  or in metal form.

### Preparation of Chlorine-substituted Aromatic Amines

GENERAL ANILINE & FILM CORP.

*British Patent* 1,138,567

These amines are produced by the catalytic hydrogenation of corresponding chloroaromatic nitro compounds using a new catalyst system. This comprises (a) 0.01-0.08% of 1-5% Pt black or Pt or Pd on C or  $\text{Al}_2\text{O}_3$ , and (b) 0.05-0.5% triphenyl or tritolyl phosphite.

### Preparation of Unsaturated Organic Esters

NATIONAL DISTILLERS & CHEMICAL CORP.

*British Patent* 1,139,210

The contact catalysts in a process for the preparation of an unsaturated organic ester from an alkene and an  $\text{O}_2$ -containing gas comprise (a) a Pd- or Pt-group metal or metal compound supported on C, and (b) a Pd- or Pt-group metal or metal supported on  $\text{Al}_2\text{O}_3$ .

### Oxidation of Ammonia

INVENTA A.G.

*British Patent* 1,139,849

$\text{NH}_3$  is oxidised by mixing with  $\text{O}_2$  in volume ratio  $\text{NH}_3 : \text{O}_2$  of 1 : 1.10-1.27 and passing the mixture with steam over a Pt or Pt-Rh catalyst at a specified flow velocity at 800-950°C. The catalyst may be a Pt-Rh grid containing 90% Pt, 10% Rh.

### Preparation of Aryl Thiols

UNITROYAL INC.

*U.S. Patent* 3,399,238

$\text{C}_6\text{H}_6$  and *p*-toluene thiols are produced by the hydrogenation of the corresponding aryl sulphuric acid over a PtS catalyst.

### Production of 1-Naphthol

UNION CARBIDE CORP. *U.S. Patent 3,402,210*

The dehydrogenation of 3,4-dihydro-1-(2H)-naphthalenone is catalysed by a supported mixture of 0.25–5 wt% Pt metal and 0.25–1.5 wt% of Nd in the form of an inorganic compound, e.g. NdCl<sub>3</sub>.

### Hydrocracking Catalyst

STANDARD OIL CO. *U.S. Patent 3,403,094*

The catalyst comprises a known active Group VIB or VIII metal such as Pt deposited on a fluorided SiO<sub>2</sub>-Al<sub>2</sub>O<sub>3</sub> cracking catalyst and promoted with an alkali metal or alkaline earth metal.

### Group VIII - Aluminosilicate Catalyst

PULLMAN INC. *U.S. Patent 3,403,108*

An improved catalyst for unsaturated ester production consists of an alkaline metal aluminosilicate with about 0.1–15 wt% of a Group VIII metal having an atomic number of at least 44 and a Fe(III), Cu, Cr or W halide, e.g. PdCl<sub>2</sub> and CuCl<sub>2</sub> on a zeolite.

### Selective Hydrogenation of Olefines

SINCLAIR RESEARCH INC. *U.S. Patent 3,404,192*

The hydrogenation of straight chain olefines in the presence of branched olefines is catalysed by a Pt catalyst produced by treating a deactivated zeolite with H<sub>2</sub>PtCl<sub>6</sub>.

### Hydrocracking Process

UNION OIL CO. OF CALIFORNIA

*U.S. Patent 3,405,056*

When the H<sub>2</sub>S concentration is low, the catalyst for hydrocracking may be a zeolite promoted with a partially (coke) – deactivated Group VIII noble metal (especially Pd).

### Hydroxylammonium Salts

FARBENFABRIKEN BAYER A.G.

*U.S. Patent 3,406,011*

These salts are produced by the reduction of NO with H<sub>2</sub> in the presence of noble metal catalysts, e.g. Pt/C, which are periodically or continuously treated with O<sub>2</sub> to maintain the catalyst selectivity and activity.

### Oxidation of Alcohols to Carboxylic Acids

SHELL OIL CO. *U.S. Patent 3,407,220*

Saturated aliphatic straight chain primary alcohols are selectively oxidised to the corresponding carboxylic acids in the presence of branched chain acids by using finely dispersed Pt as the catalyst.

### Production of Methyl Pentamethylenediamine in Two Stages

NATIONAL DISTILLERS & CHEMICAL CORP.

*U.S. Patent 3,408,397*

An appropriated dinitrile is reduced over a Pd or Pt catalyst and then the product is reacted with

NH<sub>3</sub> and/or a tertiary amine in the presence of a catalyst containing Ru, Ni or Co.

### Treatment of Combustible Wastes

UNIVERSAL OIL PRODUCTS CO.

*U.S. Patent 3,409,390*

Noxious exhaust gases are oxidised by contacting under oxidising conditions with a catalytic composite essentially of Al<sub>2</sub>O<sub>3</sub>, a Pt-metal (0.01%–1% by wt) and an alkaline earth component (>1%).

### Catalytic Isomerisation of Saturated Hydrocarbons

UNIVERSAL OIL PRODUCTS CO.

*U.S. Patent 3,409,682*

The catalyst for isomerisation of saturated hydrocarbons comprises at least one active catalytic component, preferably Pt, on an Al<sub>2</sub>O<sub>3</sub> support in which not more than 20% of a finely divided crystalline aluminosilicate is dispersed.

### Catalytic Isomerisation of Xylene

UNIVERSAL OIL PRODUCTS CO.

*U.S. Patent 3,409,685*

Alkyl aromatic hydrocarbons are isomerised in contact with a Group VIII metal catalyst (e.g. Pt) on an Al<sub>2</sub>O<sub>3</sub>/aluminosilicate matrix and also in contact with about 0.001–2.0 wt% of an S-containing isomerisation promoter. See also *U.S. Patent 3,409,686*.

### Dehydrogenation of Cycloparaffinic Hydrocarbons

UNIVERSAL OIL PRODUCTS CO.

*U.S. Patent 3,409,690*

The catalyst for dehydrogenating cyclo-paraffinic hydrocarbons to aromatic hydrocarbons comprises a refractory inorganic oxide (e.g. Al<sub>2</sub>O<sub>3</sub>) containing at least one metal (e.g. Pt) from Group VIII of the periodic table, chemically combined with a metal subfluoride (e.g. AlF) vapour. See also *U.S. Patent 3,409,699*.

### Catalytic Olefines Isomerisation

ETHYL CORP.

*U.S. Patent 3,409,702*

α-Olefines (4–24C) are effectively isomerised to β-olefines in a process using a catalyst of mixtures of Group VIII metals on an inert support, e.g. Rh, Pd, Ru and Pt on charcoal.

### Catalytic Reforming

UNIVERSAL OIL PRODUCTS CO.

*U.S. Patent 3,410,789*

Gasoline or naphtha fractions are reformed in contact with a refractory inorganic oxide (Al<sub>2</sub>O<sub>3</sub>) containing a Group VIII metal (Pt) which has been contacted with vapours of AlF or a Si subfluoride and a S-containing component (tert-butyl mercaptan). See also *U.S. Patent 3,410,790*.

### Catalytic Transalkylation

UNIVERSAL OIL CO. U.S. Patent 3,410,921

A polyalkylated aromatic compound is trans-alkylated by reacting the compound in admixture with  $H_2$ , with alkylatable aromatic compound in contact with a catalyst. The catalyst is preferably a Group VIII metal (e.g. Ni, Pt, Pd; especially Pt) on an aluminosilicate support under trans-alkylating conditions.

### Butyraldehyde Production

JOHNSON MATTHEY & CO. LTD

German Patent 1,278,420

The hydrogenation of crotonaldehyde in the liquid phase using a trickle column reactor is catalysed by Pd/ $Al_2O_3$ .

## HOMOGENEOUS CATALYSIS

### Production of Unsaturated Compounds

IMPERIAL CHEMICAL INDUSTRIES LTD

British Patent 1,138,366

Unsaturated diesters and diethers are produced by contacting a conjugated diene with a carboxylic acid or an organic hydroxy compound in the presence of a salt (not a nitrate or sulphate) or coordination compound of Pd, Pt, Ni, Fe or Co, e.g. palladium acetate, chloride or acetylacetonate.

### Improvement in Catalytic Reactions

G. WILKINSON

British Patent 1,138,601

Hydrogenation, hydroformylation or carbonylation reactions are catalysed by a complex of a Pt metal halide or pseudohalide and either (a) an organic nitrile or (b) a N, P, As, Sb, Bi, S or Se compound. For example  $(Ph_3As)_2RhCl_3$  catalyses the hydrogenation of hexyne-1 to  $C_6H_{14}$ .

### Decomposition of Formic Acid

IMPERIAL CHEMICAL INDUSTRIES LTD

British Patent 1,138,946

The selective destruction of  $HCOOH$  in the presence of  $CH_3COOH$  is achieved by oxidation with  $O_2$  using a catalyst system comprising a soluble Pt compound and a redox system, e.g.  $PdCl_2$ ,  $LiCl$ ,  $LiOAc$  and  $Cu(OAc)_2$ .

### Production of Unsaturated Aliphatic Nitriles

ASAHI KASEI K.K.K.

British Patent 1,139,398

An unsaturated aliphatic nitrile is produced by contacting a gaseous mixture of an olefinic hydrocarbon,  $HCN$  and  $O_2$  with a catalyst selected from Pd metal, Pd compounds and mixtures consisting predominantly of at least one of  $PdCl_2$ ,  $CsBr$  and  $SiO_2$ . Alternatively high temperature ( $\sim 300^\circ C$ ) may be used while feeding in simultaneously a gaseous mixture of halogenated aliphatic nitrile and hydrogen halide or halogenated aliphatic nitrile, unsaturated aliphatic nitrile and hydrogen halide.

### Improvements in or Relating to the Production of Silicon Compounds

IMPERIAL CHEMICAL INDUSTRIES LTD

British Patent 1,140,424

Organic silicone compounds (e.g.  $Cl_3SiCH_2CH_2SiCl_3$ ) are prepared by contacting a compound containing at least one Si-H bond with an organic compound containing at least one acetylenic or olefinic bond in the presence of a catalyst of general formula  $RhX(R'R''R''')_3$  where X is an anionic element or group,  $R'$ ,  $R''$ ,  $R'''$  are organic groups and Y is As, Sb or Bi, e.g.  $RhCl(Ph_3P)_3$ .

### Oxidation of Aromatic Compounds

LUMMUS CO.

British Patent 1,141,238

Aromatic compounds, having at least one unsubstituted position on the ring and free from any unsaturated substituent groups, are oxidised to phenols in the presence of an alcohol and a Group VIII noble metal compound, e.g.  $C_6H_6$  in the presence of  $PdCl_2$ ,  $CuCl_2$  and ethylene glycol gives phenol.

### Production of Lactones and Ketones

IMPERIAL CHEMICAL INDUSTRIES LTD

British Patent 1,141,353

Dienes are converted to cyclic ketones and lactones by reaction with CO in the presence of Pd and acid ions. The Pd is preferably in complexed form as in  $PdI_2(PBu_3)_2$ .

### Production of Polynuclear Aromatic Compounds

GULF RESEARCH & DEVELOPMENT CO.

U.S. Patent 3,401,207

Polynuclear compounds are produced from aromatic compounds having at least one labile H atom by contacting them with a noble metal salt of an organic acid in the presence of a strong acid; halide and nitrate ions must be absent. A typical catalyst consists of Pd acetate and  $HClO_4$ .

### Saturated Aliphatic Nitrile Production

ASAHI KASEI K.K.K.

U.S. Patent 3,407,223

These nitriles are produced by the reaction of  $C_2H_4$  or  $C_3H_6$  and  $HCN$  at  $200-600^\circ C$  in the presence of Pd, Rh or their salts,  $H_3PO_4$  and ammonium thiocyanate, Al thiocyanate or  $AlCl_3$ .

### Catalytic Ester Production

SHELL OIL CO.

U.S. Patent 3,407,224

The reaction of conjugated dienes and carboxylic acids to produce 2,7-alkadienyl esters is catalysed by a Pt, Pd or Ru compound activated by a phenoxide anion. In an example  $PdCl_2$  activated by sodium phenate ( $NaOPh$ ) is used to catalyse the production of 2,7-octadienyl acetate from butadiene and  $CH_3COOH$ .

### Solutions of Noble Metal Compounds

LUMMUS CO. *U.S. Patent 3,410,807*

Stable homogeneous solutions suitable for the catalytic oxidation of olefines, aromatic hydrocarbons, CO and SO<sub>2</sub> are compounds of Group VIII metals with a concentration of metal ion between 0.01 and 0.0001 mol/l, mono- or polyhydric alcohols containing about 0.1-12% by vol. of H<sub>2</sub>O. The Group VIII metal compound is preferably PdCl<sub>2</sub>.

### Catalytic Addition of Si-H to C=C and C≡C

UNION CARBIDE CORP. *U.S. Patent 3,410,886*

Si-C compounds are produced by contacting a compound containing at least one Si-H with an aliphatic organic compound having C=C or C≡C in the presence of a Pt (II) complex for sufficient time to form the Si-C bond.

## FUEL CELLS

### Fuel Cells and other Galvanic Cells

ALLMANNA SVENSKA ELEKTRISKA A.B.

*British Patent 1,133,921*

Porous electrodes, e.g. made from Ni powder, are now modified by adding 0.005-0.1% Pt metal before sintering so that the added metal lies in the active surface.

### Fuel Cell Electrode

STANDARD OIL CO. OF INDIANA

*U.S. Patent 3,405,007*

Catalytic metals are deposited on porous conducting supports by impregnating the support with a compound of the metal (e.g. H<sub>2</sub>PtCl<sub>6</sub>) and reducing carboxylic acid and then heating it.

### Spinel-Ruthenium Catalysed Electrodes

UNION CARBIDE CORP. *U.S. Patent 3,405,010*

Electrodes especially suitable for fuel cells consist of a support treated with a heavy metal salt, an Al salt and a Ru salt and then heated at 700-900°C to form the required spinel. The heavy metal may be Au and Ag, among other metals.

### Hydrogen Control in Fuel Cells

PROTECH INC.

*U.S. Patent 3,407,094-5*

H<sub>2</sub> is generated from carbonaceous fuel reformation for passage to a fuel cell where a permeable Pd membrane is used to control current generation. In 3,407,095 a Pd-containing film is used.

## CATHODIC PROTECTION

### Anode Assembly for the Internal Cathodic Protection of Pipes against Corrosion

W. C. HERAEUS G.m.b.H.

*British Patent 1,133,285*

The anode is made with a surface of Ti, Ta, Nb or an alloy of one of these metals coated with a

Pt group metal wound round helically with a plastic insulator.

## CHEMICAL TECHNOLOGY

### Improvements in or Relating to Gas Permeable Diaphragm

ENERGY CONVERSION LTD

*British Patent 1,139,501*

A gas-permeable diaphragm comprises a non-porous gas-permeable metallic member (Pd) adhering face to face with a non-porous sheet of polymeric material permeable to at least the same gases as the metal.

### Hydrogen-Permeable Membrane and Hydrogen Permeating Assembly

JAPAN GAS-CHEMICAL CO.

*British Patent 1,140,952*

A H<sub>2</sub>-permeable membrane of Pd or Pd-alloy (0.3-0.005 mm thick) is characterised by a plurality of convexities protruding in the direction of the thickness of the membrane and concavities surrounding these convexities so that it has a wavy configuration longitudinally and laterally. The Pd-alloy may be Pd-Ag-Au.

## ELECTRICAL AND ELECTRONIC ENGINEERING

### Semiconductor Devices

C.K.D. PRAHA, OBOROVY PODNIK

*British Patent 1,135,068*

Junction problems between semiconductor wafers in pressure contact with electrode contact plates are overcome by applying a layer of Rh to both contact surfaces.

### Electrical Resistance Element

INTERNATIONAL BUSINESS MACHINES CORP.

*U.S. Patent 3,411,122*

A laminated electrical resistance structure consists of an insulating base supporting a conductive layer of a finely divided metal and metal oxide (e.g. Pd-Ag, Pd oxide or In oxide) and a layer of a polyimide condensation product.

## TEMPERATURE MEASUREMENT

### Thermistor Compositions

E. I. DU PONT DE NEMOURS & CO.

*U.S. Patent 3,408,311*

Thin film thermistors with a negative coefficient of resistance are produced by applying and firing (on a substrate) a mixture of finely divided Pd mixed with up to 60% Ag and an inorganic binder as before but now also a finely divided mixture of Co<sub>2</sub>O<sub>3</sub> and MnO<sub>2</sub>.