

TEMPERATURE MEASUREMENT

An Electrical Deep-Sea Thermometer with Short Adjustment Time

H. HINKELMANN and H. M. IHME, *Z. angew. Phys.*, 1963, **15**, (5), 429-435

A Pt resistance thermometer has been designed for deep sea work. It has a time constant of only 0.2 sec. The construction of the apparatus and the control circuit are fully described. The Pt wire is about 1 m long, 0.06 mm diameter and about 30 ohm resistance. It is protected by a Au capillary pressure housing. The accuracy of the arrangement is better than 0.01°C.

Problems Encountered Using IrRh-Ir Thermocouples for Measuring Combustion Gas Temperatures.

C. M. STANFORTH, *Soc. Automotive Eng*, 1962, (524F), 1-3

An Ir:Rh-Ir thermocouple was flame-sprayed with Al₂O₃ and then registered temperatures close to calculated values at a jet engine burner using JP-4 fuel. A similar unsprayed thermocouple gave much higher results. Catalytic action at the

metal surface was suspected in the second case although it had been believed that this did not take place above 1200°F. The thermocouples are required as jet engine control devices operating up to 3500°F. Possible errors due to radiation, conduction and slow recovery are discussed.

Relationship between the Real and Ideal Resistivity of Platinum

R. J. BERRY, *Canad. J. Phys.*, 1963, **41**, (6), 946-982

Data on 138 Pt resistance thermometers were correlated to find a relation between the real and ideal resistance functions of Pt by Matthiessen's Rule. Kohler's expression for deviations from this rule was not applicable in general but in the range 20 to 90°K held fairly well for about $\frac{1}{3}$ of the resistors examined. Values for the ideal resistance function were found by extrapolation of measurements on many thermometers. A special method in the range 20 to 90°K gave more accurate results than previously. Methods for determining the residual resistance ratio at 0°K were studied. To extend the Pt resistance temperature scale below 90.19°K some differences in interpolating the real resistance function between fixed calibration points were outlined and compared with previous methods.

NEW PATENTS

Carotenoid Compounds

ROCHE PRODUCTS LTD. *British Patent* 924,255

A palladium/lead (calcium carbonate) catalyst is used in a hydrogenation step in a method of making carotenoid and dehydro-carotenoid compounds of given formula.

Pyridoxal Derivatives

LEPETIT S.p.A. *British Patent* 924,514

A palladium-on-charcoal or a platinum oxide catalyst is used in a process of preparing new pyridoxal derivatives of given general formula.

Pyridine Bases

THE DISTILLERS CO. LTD. *British Patent* 924,527

A catalyst of silica and/or alumina and palladium may be used in a process of producing pyridine bases by heating crotonaldehyde, ammonia and a saturated aliphatic ketone.

Removing Acetylene Hydrocarbons from Gaseous Mixtures

FARBWERKE HOECHST A.G. *British Patent* 924,627

For the removal of acetylene hydrocarbons and butadiene from gaseous mixtures containing hydrogen and olefines, the mixture is passed over a palladium-silica catalyst containing less than 1 wt. % of palladium at 150°-300°C and at a rate of 150-500 litres per litre of catalyst per hour.

Electrolysis of Salt Solutions

RUHRCHEMIE A. G. *British Patent* 925,079

The counter electrode of a mercury amalgam cell is formed of a double skeleton material, from 1-10% of the iron group metal carrier material of which is replaced by platinum, palladium, iridium or ruthenium.

Titanium-cored Electrode

AMALGAMATED CURACAO PATENTS CO. N.V. *British Patent* 925,080

A platinum group metal coated-titanium electrode having a titanium oxide barrier layer has this barrier layer formed electrolytically or by oxidation before the platinum coating is applied.

Preparation of Alkanediols

E. I. DU PONT DE NEMOURS & CO. *British Patent* 925,404

An alkanediol having 5 or more carbon atoms in the molecule is made by reacting together at 100°C or above and at least 1000 atm pressure an acyclic diene hydrocarbon, carbon monoxide, formaldehyde and hydrogen in the presence of a catalyst formed of a salt, organic chelate or carbonyl of a Group VIII noble metal, e.g. rhodium (III) or ruthenium (III).

Hydrogenation of Nitroparaffins

ENGELHARD INDUSTRIES INC. *British Patent* 925,458

A nitroparaffin is hydrogenated to the corresponding amine by treating a solution thereof in methanol with hydrogen at a pressure of 0–200 p.s.i.g. and temperature of from room temperature to 400°C and in the presence of a palladium-on-carbon or rhodium-on-carbon catalyst.

Trifluoromethylthioxanthene

SMITH KLINE & FRENCH LABORATORIES *British Patent* 925, 538

Refers to the use of a platinum oxide hydrogenation catalyst in the preparation of the above compound.

Cyclopentanophenanthrene Derivatives

S. A. SYNTEX *British Patent* 925,849

Refers to the use of a palladium-on-carbon hydrogenation catalyst in the preparation of the above compounds.

Catalyst for Hydrogenation of Acetylene

VEB LEUNA-WERKE "WALTER ULBRICHT" *British Patent* 926,263

A catalyst for the selective hydrogenation of acetylene is composed of up to 5% by wt. of palladium and silver together on an inert carrier. The palladium constitutes 99–60% of the total of the two metals. 20 to 80 times the total palladium and silver content of iron oxide is also included.

Polymerisation Catalysts

THE BRITISH PETROLEUM CO. LTD. *British Patent* 926,765

A solid polymerisation catalyst consists of an organometallic compound of specified kind carried by a solid support material, e.g. alumina or an alumina/silica composite which contains platinum as a free metal constituent.

Diaphragm for Use in Electrolysis

AMALGAMATED CURACAO PATENTS CO. N.V. *British Patent* 926,884

A diaphragm is composed of a titanium, zirconium or tantalum sheet with perforations extending from one side to the other and having a barrier layer of one side formed by oxidation which entirely prevents the passage of electronic current from the metal when in use. The other side of the diaphragm carries a thin layer of platinum metal or an alloy of platinum metals.

Cathodic Protection of Metallic Parts

CENTRAL ELECTRICITY GENERATING BOARD *British Patent* 927,232

An anode in the form of a strip of titanium coated on one side with a thin porous layer of platinum and mounted on a backing of synthetic resin is used for cathodic protection of metallic parts.

Regenerable Catalyst

THE ATLANTIC REFINING CO. *British Patent* 927,424

A catalyst for conversion of hydrocarbons is composed of composite pelleted or extruded masses. Each mass consists of a mixture of alumina particles carrying deposited platinum and of particles of a calcined silica-alumina cracking component. The alumina and platinum comprise 10–90 wt.% of the catalyst (Pt = 0.1–2.5 wt. %). Silica-alumina component has 7–50% alumina.

Hydrogenation of Liquid Hydrocarbons

FARBENFABRIKEN BAYER A. G. *British Patent*, 927,631

Liquid hydrocarbons of gasoline boiling point range are hydrogenated at below 50°C by trickling them over a Group VIII metal catalyst carried on a macroporous support having an intrinsic surface area of less than 50 m²/g and a water absorption capacity of at least 10% by wt. Iron-free clay shards impregnated with palladium chloride and reduced to metal may be used as catalyst.

Therapeutically Active N-Carboxyalkyl-2-Phenylethylamine Derivatives

N. V. PHILIPS GLOEILAMPENFABRIEKEN *British Patent* 927,896

A 10% palladium-carbon or a powdered platinum catalyst is used in the preparation of the above compounds.

Substituted Pyrrolidines

E. BOCHRINGER *British Patent* 928,007

Reference is made to the use of rhodium as a catalyst in the preparation of phenyl pyrrolidines of given general formula.

Pyrazine Derivatives

SOC. FARMACEUTICA ITALIA *British Patent* 928,152

A palladium-on-charcoal catalyst is used in a process of preparing a 2-aminopyrazine derivative of given general formula.

Complex Compounds of Transition Metals

IMPERIAL CHEMICAL INDUSTRIES LTD. *British Patent* 928,441

A new complex compound consists of two constituents, i.e. (1) a transition metal hydride, halohydride, alkylhydride, arylhydride or thiocyanatohydride and (2) a constituent of given general formula. The transition metal is preferably ruthenium, rhodium or osmium. See also No. 928,442.

Oxidation of Hydrocarbons

IMPERIAL CHEMICAL INDUSTRIES LTD. *British Patent* 928,443.

Covers the use of the compounds of Nos. 928,441

and 928,442 in the production of unsaturated carbonyl compounds.

Fuel Cells

LEESONA CORP. *British Patent* 928,499

A hydrogen diffusion fuel cell electrode is formed of a non-porous palladium-silver alloy membrane, e.g. a tube of thickness of 0.03-30 mil. A 25% Ag-Pd alloy is used.

Ceramic-to-Metal Seals

WESTERN ELECTRIC CO. INC. *British Patent* 928,523

A ceramic surface is sealed to a metal surface by coating the ceramic with a layer of tungsten or molybdenum or both with up to 10 wt.% of titanium hydride or zirconium hydride, sintering the coating and then brazing the surfaces together with a palladium-nickel or palladium-cobalt brazing alloy.

Production of Desoxy Sugars

DR. A. WANDER S.A. *British Patent* 928,655

3,6-didesoxy-hexoses are prepared by treating 2,5-didesoxy-pentoses with hydrocyanic acid and then hydrogenating the resulting cyanohydrins in dilute hydrochloric acid using a palladium oxide-on-barium sulphate catalyst.

Preparation of Dibenzofurans

IMPERIAL CHEMICAL INDUSTRIES LTD. *British Patent* 929,376

Dibenzofuran or its homologues is/are made by contacting diphenyl oxide or a homologue thereof, at elevated temperature with a catalyst composed of platinum-on-charcoal.

Production of Pyridine Bases

THE DISTILLERS CO. LTD. *British Patent* 929,592

A catalyst containing palladium may be used in a process of producing pyridine and β -picoline by heating ammonia with a vaporised mixture of formaldehyde and acetaldehyde in the presence of ethanol and *n*-propanol vapour.

Isomerisation of Paraffin Hydrocarbons

THE BRITISH PETROLEUM CO. LTD. *British Patent*, 929,654

C₄ or higher paraffin hydrocarbons boiling in gasoline range are isomerised by contact in the presence of hydrogen with a platinum group metal and aluminium halide catalyst on a refractory oxide support, from which catalyst unreacted halide has been removed by heating to 650^o-750^oF.

Reforming Catalysts

SHELL INTERNATIONALE RESEARCH MAATSCHAPPIJ N.V. *British Patent* 929,699

A catalyst for reforming hydrocarbon oils comprises a platinum group metal, e.g. platinum, and an alkyl orthosilicate on a catalyst carrier, e.g. silica or aluminium oxide.

Colloidal Catalyst Solutions

SHIPLEY CO. INC. *British Patents* 929,800

A colloidal catalyst solution is formed from an admixture of an acid soluble salt of a platinum group metal, a hydro-halide acid, and a stannous salt soluble in aqueous solution and being present in amount in excess of that required to reduce the metal salt to colloidal metal.

6-Hydroxymethyl Steroids

THE BRITISH DRUG HOUSES LTD. *British Patent* 929,983

A platinum-on-charcoal catalyst is used in the preparation of 3-enol ethers of 6-hydroxymethyl-3-oxo- Δ^4 -steroids by reduction of the corresponding 3-enol ether of a 6-formyl-3-oxo- Δ^4 -steroid by catalytic hydrogenation.

Hydrocracking Catalyst

ESSO RESEARCH & ENGINEERING CO. *British Patent* 930,044

A hydrocarbon conversion catalyst is formed of a platinum-impregnated porous alumina on the outer surface of which is a ferro-magnetic deposit.

Synthesis of Imidazoles and Pyrimidines

HOUDRY PROCESS CORP. *British Patent* 930,090

A platinum-on-alumina catalyst is used in the preparation of imidazoles and pyrimidines by reacting in vapour phase an alkylene diamine with an alcohol or aldehyde.

Production of Aldehydes and Ketones

CONSORTIUM FÜR ELEKTROCHEMISCHE INDUSTRIE G.M.B.H. *U.S. Patent* 3,080,425

An aldehyde or a ketone is made by contacting an olefinically unsaturated hydrocarbon with an aqueous solution of a catalytically active inorganic salt of a platinum group metal at from above 0^oC to 200^oC in the presence of a multivalent metal salt having an oxidation potential higher than that of the platinum metal salt in the solution.

Catalyst for Rocket Fuel

THOMPSON RAMO WOOLDRIDGE INC. *U.S. Patent* 3,081,595

Hydrazine is converted to NH₃, N₂ and H₂ and the propulsive gas is generated by decomposing the NH₃ on a platinum or palladium catalyst.

Electrolytic Capacitors

SPRAGUE ELECTRIC CO. *U.S. Patent* 3,082,360

In capacitors where one electrode is the casing and the other a shaped element, the area in contact with the electrolyte is increased by applying a coating of spongy platinum or palladium.

Solder

ASSOCIATED ELECTRICAL INDUSTRIES LTD. *U.S. Patent* 3,083,451

A brazing solder for joining beryllium and a base metal consists of 55-70% silver, 20-30% copper and 10-20% palladium.

Monocrystalline Permanent Magnets

CENTRO MAGNETI PERMANENTI U.S. Patent 3,085,036

Gamma precipitant in a nickel-aluminium-cobalt-titanium alloy is platinum, osmium, iridium, palladium, rhodium or ruthenium.

Super Alloys

E. I. DU PONT DE NEMOURS & CO. U.S. Patent 3,085,876

Alloys consisting of a refractory oxide dispersed in a metal matrix (e.g. platinum group metals) are produced by co-precipitating the refractory metal and the matrix metal as oxides and then reducing the matrix metal oxide.

Catalyst

CONSORTIUM FUR ELEKTROCHEMISCHE INDUSTRIE U.S. Patent 3,086,994

Catalytic oxidation of olefines takes place in the presence of a platinum group metal salt having catalytic activity, e.g. palladium chloride and an iron and/or copper salt.

Olefine Oxidation Catalyst

FARBWERKE HOECHST A. G. U.S. Patent 3,087,968
Olefines are converted to aldehydes and ketones by oxidation using molecular oxygen in the presence of a palladium, iridium, ruthenium, rhodium or platinum catalyst and a redox system.

Carbon Monoxide Oxidation

ENGELHARD INDUSTRIES INC. U.S. Patent 3,088,919
Carbon monoxide in ammonia synthesis gas is removed by adding a source of oxygen and then passing the mixture over a supported platinum catalyst to oxidise CO preferentially to CO₂.

Production of 16 α -Methyl Steroids

MERCK & CO. INC. U.S. Patent 3,090,781
The 6-ethynyl group of the steroid is hydrogenated over a lead-deactivated palladium-on-calcium catalyst and then oxidised to the 6-diol with osmium tetroxide.

Phthalonitrile Production

THE PURE OIL CO. U.S. Patent 3,091,629
The reaction of benzonitrile and cyanogen to form phthalonitrile is catalysed with a catalyst of a platinum group metal deposited on a high surface area support, e.g. 0.5% rhodium on alumina.

Combustion Catalysts

ENGELHARD INDUSTRIES INC. U.S. Patent 3,092,444
Acetylene is removed from gas mixtures containing excess oxygen and also nitrogen by combustion of the acetylene at 40°C over a supported rhodium catalyst.

Fuel Cell Barrier

STANDARD OIL CO. U.S. Patent 3,092,516
Chemically incompatible ions in fuel cells are separated by a palladium barrier.

Fuel Cell Electrode

LEESONA CORP. U.S. Patent, 3,092,517
In fuel cells using hydrogen as fuel, the fuel electrode is made of a non-porous silver-palladium alloy membrane through which hydrogen diffuses as protons or hydrogen ions.

Platinum Metal Catalyst

FMC CORP. U.S. Patent 3,092,638
2-pyrrolidone is produced by reacting succinimide with hydrogen and ammonia in the presence of ruthenium, palladium or platinum at 60–350°C and 50–10,000 p.s.i.g.

Catalyst

E. I. DU PONT DE NEMOURS & CO. U.S. Patent 3,092,654
The formation of dinitriles, e.g. adiponitrile, from cyclic nitriles by hydrogenation is catalysed with a palladium, rhodium or platinum catalyst.

Catalysts

ENGELHARD INDUSTRIES INC. U.S. Patent 3,092,676
In an alkane isomerisation process, the catalyst is alumina mixed with boron oxide carrying a catalytic amount of rhodium, which is treated with hydrogen sulphide before use.

Platinum Metal Catalysts

E. I. DU PONT DE NEMOURS & CO. French Patent 1,320,296
Catalysts which retain their activity at higher operating temperatures than hitherto are produced by contacting an aqueous solution of an ionisable salt of platinum, silver, ruthenium, palladium or rhodium with a suitable support to deposit 0.1–5% metal and subjecting the product to the action of hydrogen or another reducing gas at a controlled humidity.

Hydrogen-Permeable Palladium Alloy Wall

KABUSHIKI KAISHA YAMAMOTO K. K. French Patent 1,320,481
Permeable wall for hydrogen purification consists of 2–40% group I metal, 0.1–20% Group VIII element and the remainder palladium, e.g. 65% palladium, 30% silver and 5% platinum.

Boron Phosphide Production

MONSANTO CHEMICAL CO. German Patent 1,149,695
Boron or a boron compound is reacted with a source of phosphorus to produce crystalline boron phosphide in a medium consisting of a molten platinum metal.