

temperature measurement depend are described briefly. The principles underlying the operation of thermocouples and the range of some common base metal and Pt metal thermocouple combinations are discussed. Among the other topics

discussed are the insulation and protection of thermocouple wires by ceramic materials and metal sheaths, the measurement of thermal e.m.f., errors of measurement, and calibration of thermocouples.

NEW PATENTS

Titanium Alloys

UNION CARBIDE CORP. *British Patent 882,184*

A titanium alloy capable of withstanding the corrosive action of non-oxidising acid contains 50% or more of titanium, a total of 0.005–5% by wt. of one or more of gold, rhenium and a platinum group metal and balance titanium alone or an alloy thereof with molybdenum or manganese or with aluminium and vanadium.

Non-emissive Electrode

"PATELHOLD" PATENTVERWERTUNGS- & ELEKTROHOLDING A.G. *British Patent 882,480*

A non-emissive electrode for electric discharge vessels has at least part of its surface covered first with a layer of rhenium and then with a layer of a platinum group metal, both layers being of a thickness of about 1 μ . The layers may be applied electrolytically to a core of tungsten, molybdenum, tantalum, indium, zirconium or hafnium.

Treatment of Gases

ENGELHARD INDUSTRIES INC. *British Patent 882,536*

The preferential oxidation of carbon monoxide mixed with a hydrogen-containing gas is effected by first adding water to the gaseous mixture of carbon monoxide, hydrogen, nitrogen and carbon dioxide, and then air sufficient to provide an oxygen to CO volume ratio of 3 : 1 to 0.25 : 1. The resulting mixture is then passed over a supported platinum catalyst at elevated temperature to convert the CO to CO₂.

Preparation of Cyclohexylsulphamic Acid

ABBOTT LABORATORIES *British Patent 882,752*

In the preparation of cyclohexylsulphamic acid and physiologically acceptable salts thereof, phenylsulphamic acid and salts thereof are hydrogenated in the presence of a catalytic amount of rhodium; 5% rhodium on alumina may be used.

Purification of Waste Gases

ENGELHARD INDUSTRIES INC. *British Patent 883,944*

Waste gases containing free oxygen and oxides of nitrogen are purified by the combustion of the gases and a gaseous fuel in a first reaction zone (less than the stoichiometric amount of fuel for complete reaction being used) and in the presence of a platinum group metal – containing catalyst, cooling of the effluent gases and then the com-

bustion, in a second reaction zone, of a mixture of these gases and additional gaseous fuel also in the presence of a similar catalyst. The catalyst is preferably palladium and the fuel methane or natural gas. Inlet temperature in each zone is 200–900°C.

Removal of Free Oxygen and Reduction of Oxides of Nitrogen in Waste Gases

ENGELHARD INDUSTRIES INC. *British Patent 883,945*

Free oxygen is removed from waste gases, and the oxides of nitrogen therein reduced, by contacting a mixture of the gases and a fuel gas containing saturated and unsaturated hydrocarbons and COS, CS₂ and/or H₂S with a palladium, platinum, rhodium or ruthenium catalyst. Palladium or platinum, supported on a carrier, is preferably used. Inlet temperature of the gases to the catalyst is 400°–900°F.

Selective Reduction Reactions of Oxide-containing Gases

ENGELHARD INDUSTRIES INC. *British Patent 883,946*

Selective reduction reactions of gases containing oxides of nitrogen and free oxygen are effected by combustion in a reaction zone of a mixture of the gases and ammonia in contact with a platinum group metal catalyst to reduce the oxides of nitrogen. The catalyst is preferably palladium, rhodium, ruthenium or platinum deposited on a carrier. The reaction is carried out at 150–400°C.

Acetylene Transition Metal Carbonyl Derivatives

UNION CARBIDE CORP. *British Patent 885,514*

A stable organo-metallic carbonyl reaction product is formed by heating in a non-aqueous medium a transition metal carbonyl, e.g. ruthenium, rhodium, palladium, osmium or iridium with an acetylenic compound at a suitable temperature.

Anodes for Electrolytic Cells

IMPERIAL CHEMICAL INDUSTRIES LTD. *British Patent 885,817*

An anode is formed of a foraminated titanium metal sheet wholly or partly covered with a platinum metal or an alloy of two or more such metals. Expanded titanium metal sheet is preferably used with platinum or rhodium.

Treatment of Brine Solutions

IMPERIAL CHEMICAL INDUSTRIES LTD. *British Patent* 885,818

Discloses a method for the treatment of brine solutions using an anode of No. 885,817 above.

Production of Assemblies Comprising Titanium

IMPERIAL CHEMICAL INDUSTRIES LTD. *British Patent* 885,819

A coating of platinum on titanium, e.g. in production of anodes, is obtained by superimposing a number of coatings of a platinum-bearing preparation and then heating to at least 500°C the titanium base having first been treated to remove therefrom the surface skin, chiefly oxide.

Catalyst Composition

UNIVERSAL OIL PRODUCTS CO. *British Patent* 885,886

A catalyst having cracking and hydrogenating activity is formed of a calcined composite of a hydrogenating metal from groups V to VIII and an inorganic base containing 95–20% by wt. of a refractory oxide and 5–80% by wt. of boron phosphate. The metal component constitutes at least 40% by wt. of the composite. Platinum is the preferred metal.

Manufacture of Aldehydes

CONSORTIUM FÜR ELEKTROCHEMISCHE INDUSTRIE G.m.b.H. *British Patent* 886,157

Aldehydes or ketones are made by treating one or more olefinically unsaturated hydrocarbons with an aqueous solution of a platinum group metal compound at 0–250°C and recovering the carbonyl compound so formed. A halide of palladium or platinum is used.

Reforming of Hydrocarbons

SOCONY MOBIL OIL CO. LTD. *British Patent* 886,280

Gasolines of at least 100 octane rating are produced by contacting a naphtha, boiling in the gasoline range, or a fraction thereof (octane rating of naphtha being 81–98) in a low-pressure reactor stage at a pressure of less than 35.2 kg/sq. cm gauge with a platinum or platinum-type reforming catalyst in the presence of hydrogen and under reforming conditions of temperature and space velocity.

Selective Hydrogenation of Fatty Oils

ENGELHARD INDUSTRIES INC. *British Patent* 886,477

Unsaturated fatty oils are hydrogenated by treatment with hydrogen in the presence of a catalyst consisting of supported palladium metal modified by a compound of mercury, silver, bismuth or copper.

Brazing Compositions

THE INTERNATIONAL NICKEL CO. (MOND) LTD. *British Patent* 886,591

A brazing filler composition contains 35–65%

palladium, 0.05–1% lithium, 0.002–0.2% boron, and balance of at least 24% nickel and/or cobalt. Up to 40% chromium, up to 1.5% aluminium, up to 0.5% carbon, up to 0.3% manganese, up to 0.3% silicon, up to 20% copper, up to 5% silver, up to 0.5% niobium and up to 1.5% titanium may be included.

Catalytic Reduction of Tail Gases

JOHNSON, MATTHEY & CO. LTD. *British Patent* 886,651

Catalyst elements used for the reduction of nitrogen oxide-containing effluent or tail gas are formed of a platinum group metal supported on a non-spherical solid or hollow-shaped ceramic carrier having a large surface area-to-bulk ratio. Platinised Raschig rings may be used.

Polymerisation of Unsaturated Compounds

CONSORTIUM FÜR ELEKTROCHEMISCHE INDUSTRIE G.m.b.H. *British Patent* 887,362

Compounds containing an unsaturated carbon-carbon bond are polymerised in the presence of a chloride or bromide of platinum or palladium, or a complex thereof, as catalyst in a non-basic or reducing medium at a temperature of 50–170°C and a pressure of from atmospheric to 30 atm.

Activation of Platinum Group Metal Catalysts

BERGWERKSGES. HIBERNIA A.G. *German Patent* 1,100,600

Platinum group metal catalysts are activated by contacting them with small amounts of dust of platinum group metals already used for catalytic purposes.

Production of Platinum-Rhodium Alloy Articles, such as Spinnerets for Glass

ENGELHARD INDUSTRIES INC. *German Patent* 1,106,577

In the manufacture of articles of a platinum-rhodium alloy, particularly apparatus for treatment of molten glass, such as spinnerets, a base of such an alloy is coated with first platinum and then with gold, the article then being heated to diffusion temperature to ensure the firm adherence of the coatings to one another and to the base.

Use of Platinum-Gold Alloys for Spinnerets

DEUTSCHE GOLD-UND SILBER-SCHNEIDANSTALT *German Patent* 1,106,966

An alloy of 11–92% platinum, about 0.3–1.5%, preferably 0.4–0.6% rhodium and rhenium and balance gold is used for making spinnerets for the viscose process.

Hydroforming Process

ESSO RESEARCH & ENGINEERING CO. *U.S. Patent* 3,002,920

Hydrocarbon fractions boiling in the naphtha boiling range are reformed by contacting naphtha

vapours mixed with hydrogen at 800–1000°F and pressures of 100–1000 p.s.i.g. with a catalyst consisting of 0.01–5 wt.% of a platinum group metal, combined with 0.05–5 wt.% of zirconia, supported on an adsorptive alumina carrier. Carbonaceous deposits are periodically burned from the catalyst by contacting it with oxygen at elevated temperatures.

Hydroforming Catalyst

ESSO RESEARCH & ENGINEERING CO. *U.S. Patent* 3,002,921

Hydrocarbons boiling in the naphtha boiling range are reformed by contacting the naphtha vapours at 800–1000°F and pressures of 100–1000 p.s.i.g. with a catalyst composed of 0.01–5 wt.% of a platinum group metal combined with 0.1–5 wt.% of praseodymium oxide, supported on an adsorptive alumina carrier and in the presence of 2000–10,000 cf/b of hydrogen for a period long enough to improve the octane number of the naphtha.

Catalyst Manufacture

UNIVERSAL OIL PRODUCTS CO. *U.S. Patent* 3,003,972

A catalyst is made by impregnating alumina containing over 1% by wt. of combined fluorine with a homogeneous aqueous solution of a water-soluble platinum compound, a hydrogen halide and an acid compound (nitric, sulphuric, phosphoric, acetic, oxalic, formic or propionic acid or aluminium nitrate). pH of solution is below 2.5.

Catalyst

UNIVERSAL OIL PRODUCTS CO. *U.S. Patent* 3,003,973

A catalyst is made by mixing alumina, a water-soluble platinum compound and hydrogen peroxide with ammonium hydroxide at below 212°F heating the mixture to over 212°F and adding ammonium nitrate when the temperature reaches 212°F, then drying and calcining.

Rhodium Plating

BELL TELEPHONE LABORATORIES INC. *U.S. Patent* 3,007,855

A base material containing 18–100 wt.% iron is rhodium plated by first electrodepositing a continuous rhodium layer of 0.5–3.5 mg/sq. in. directly on to the base, heating the base to cause diffusion of rhodium into the material and then electroplating a second rhodium layer thereon.

Decarbonylation of Furfural

E.I. DU PONT DE NEMOURS & CO. *U.S. Patent* 3,007,941

Furan is made from furfural by heating a liquid phase of furfural in the presence of palladium metal and a basic salt of an alkali metal.

Thermocouple System

GENERAL ELECTRIC CO. *U.S. Patent* 3,007,988

A high temperature thermocouple system includes

one thermoelectric conductor of palladium and the other an alloy of platinum and 15% iridium, the lead conductors being formed of a 4.3% silicon-nickel alloy and a 60% nickel, 15% chromium and 22% iron alloy.

Thermocouple

GENERAL ELECTRIC CO. *U.S. Patent* 3,007,990

The first and second thermoelectric elements of a thermocouple for measuring fluid temperature are formed respectively of palladium and a 15% iridium-platinum alloy.

Dehydrogenation of Nitrogen Heterocyclics

ANSUL CHEMICAL CO. *U.S. Patent* 3,008,965

Pyrrrole and N-substituted pyrroles are produced from pyrrolidine and N-substituted homologues of pyrrolidine by passing the compounds at 175°–350°C over a catalyst of alumina (surface area of 35–350 sq. m/g) and 0.1% by wt. of palladium chloride.

Production of Hydroxylamine

BADISCHE ANILIN-& SODA-FABRIK A.G. *U.S. Patent* 3,009,779

Hydroxylamine is produced by catalytic reduction of nitric oxide with hydrogen in dilute acid medium using a catalyst, in the acid medium, composed of a noble metal alloy of platinum and 1–10% by wt. of a noble metal other than platinum.

Making Carvomenthene Oxide

FOOD MACHINERY & CHEMICAL CORP. *U.S. Patent* 3,014,929

Carvomenthene oxide is prepared by reacting limonene monoxide with hydrogen at a hydrogen pressure of 1–15 atm and at 25–45°C in the presence of an inert solvent and in the presence of a platinum-containing catalyst for 20 min. to 2 hr. until 1 mole of hydrogen per mole of limonene has been reacted with the monoxide.

Hydrogenation of Phenyl-Alkyl-β-Amines

ABBOTT LABORATORIES INC. *U.S. Patent* 3,014,966

Cyclohexylalkyl-β-aminos of specified general formula are made by hydrogenating the corresponding phenyl-alkyl-β-aminos at a pressure of 1000–1300 p.s.i. and at a temperature of 60°–160°C in the presence of a catalyst of ruthenium or ruthenium dioxide supported on a carrier, until the reaction is complete and then filtering and separating the amines from the catalyst.

Resistor

TECHNOLOGY INSTRUMENT CORP. *U.S. Patent* 3,015,587

An electrical resistor element is made by depositing on a rigid electrically insulating substrate a thin film comprising rhodium and germanium in predetermined relative amounts and then heat-treating the film and substrate at elevated temperature for a long period.