

ELECTRICAL ENGINEERING

An Investigation of the Effect of Materials Used for the Construction of Telephone Exchanges on Contact Materials Containing Silver and Palladium

H. LIPKE and W. CLEMENT, *Nachrichtentech. Z. (N.T.Z.)*, 1960, **13**, (9), 431-435

Contact materials investigated at constant temperature and humidity levels were Ag, Pd, 50% Pd-Ag and 30% Pd-Ag. Resistance changes with time were the basis for conclusions on the effects of the various materials on the contacts. Organic substances such as oil of turpentine and linseed oil mainly affect Pd-containing contacts.

CHEMICAL TECHNOLOGY

The Use of Precious Metals in Plant Construction

M. WITTUM, *Metall*, 1960, **14**, (9), 897-901

Uses of Ag, Au, Pt and their alloys in the construction of chemical plant are described. The suitability of these metals for this purpose is shown by a study of their corrosion resistance and mechanical and physical properties.

NEW PATENTS

Thermocouples

ELECTROFLO METERS CO. LTD. *et al.* *British Patent* 845,031

A thermocouple consists of an insulating sheath formed as a solid elongated block of high-refractory ceramic, the hot junction being embedded in the block close to one end and the thermocouple wires emerging from the other end. A metal cladding is provided around the block leaving the hot junction end exposed. The thermocouple wires are of platinum-rhodium 20% alloy and platinum-rhodium 40% alloy.

Purification of Ethylene

ENGELHARD INDUSTRIES INC. *British Patent* 846,077

Carbon monoxide is removed from a mixture thereof with ethylene and oxygen by passing the mixture over a rhodium-containing catalyst at 25-150°C. The catalyst is preferably rhodium on activated alumina. Another platinum group metal, e.g. platinum, may also be included.

Electrical Contacts

NORTON GRINDING WHEEL CO. LTD. *British Patent* 847,200

For the purpose of inhibiting the detrimental effects of disruption at the points of contact,

GLASS TECHNOLOGY

The Increasing Use of Platinum in the Glass Industry

KASWANT, *Sprechsaal*, 1960, **93**, (18), 473-477

Economic aspects of the world supply and consumption of the Pt metals are reviewed. The principal physical properties of these metals are given in graphical and tabular form. Examples given of the applications of Rh-Pt alloys include feeders, crucibles for melting optical glass and bushings for glass fibre manufacture. Mention is made of the use of a Be-Pt alloy for silicate melts.

TEMPERATURE MEASUREMENT

Techniques in Calorimetry. I. A Noble-Metal Thermocouple for Differential Use

E. D. WEST, *Rev. Sci. Instr.*, 1960, **31**, (8), 896-897

A 40% Pd-Au:10% Rh-Pt thermocouple for use in an adiabatic calorimeter up to 600°C is described. The e.m.f. of the thermocouple together with dE/dT values are shown on a graph.

electrical make-and-break members have, at the point of contact, a flame-sprayed coating of platinum or of an alloy of platinum with another metal of the same group.

Hydroforming Process

THE BRITISH PETROLEUM CO. LTD. *British Patent* 847,728

The first stage of a two-stage platinum reforming process for treating petroleum hydrocarbons boiling within the gasoline and naphtha ranges is carried out at at least 450°C with a catalyst of platinum on a normally acidic support rendered non-acidic by the addition of sodium; the second stage is carried out at a similar temperature using a catalyst of platinum on an acidic support. Support preferably consists of alumina.

Dehydrogenation of Alicyclic Alcohols

ENGELHARD INDUSTRIES INC. *British Patent* 849,135

An alicyclic alcohol is dehydrogenated to an alicyclic ketone by passing the alcohol at a pressure from subatmospheric to atmospheric over a catalyst consisting of ruthenium supported on carbon preferably at a temperature of 50-700°C.

Nitrocyclododecanes

STUDIENGESELLSCHAFT KOHLE m.b.H. *British Patent 849,237*

A palladium-barium sulphate catalyst is used in a process for making the oxime of cyclododecanone by mild selective reduction of aci-nitrocyclododecane.

Electrical Resistance Element

BECKMAN INSTRUMENTS INC. *British Patent 849,305*

A resistance element consists of a high temperature resistant base on which is fired a layer of resistance material composed of a minor amount of one or more noble metals and a major amount of non-absorptive, electrically non-conductive binder material of glass of lower melting point than the metal, the metal being finely divided and dispersed throughout a continuous phase of solidified glass. The metal, which may be platinum, rhodium or palladium, constitutes 1-16% by weight of the resistance material.

Chlorination of Hydrocarbons

BADISCHE ANILIN & SODA FABRIK A.G. *British Patent 849,434*

Chlorination of a hydrocarbon or a partly hydrogenated derivative thereof is effected by allowing chlorine to act on it in the gas phase at a temperature at or above its boiling point up to about 400°C in the presence of a catalyst containing a halide of platinum, palladium, iridium or rhodium.

Magnet Alloys

JOHNSON, MATTHEY & CO., LTD. *British Patent 849,505*

A cobalt-platinum alloy (17-27% cobalt) is heat-treated to produce permanent magnet properties at a temperature to produce disordering within the alloy, followed by quenching to an ordering temperature of 500-750°C, the alloy being maintained at this temperature for ¼-5 hours and finally quenched in water or allowed to cool in air.

Electric Furnace Heater Elements

JOHNSON, MATTHEY & CO., LTD. *British Patent 849,507*

An electric furnace heater element is made by flame-spraying on to a platinum group metal or alloy wire or strip a thin layer of alumina of 2-50 thousandths of an inch. A platinum-rhodium (10-40%) alloy is used.

Spinning Nozzles

W. C. HERAEUS G.m.b.H. *British Patent 849,840*
A spinning nozzle is made of an alloy of palladium and 1-30% ruthenium, up to 15% of the palladium being replaceable by another platinum group metal. Ex: (1) 90% Pd, 10% Ru; (2) 90% Pd, 5% Ru and 5% Ir; (3) 85% Pd, 5% Ru and 10% Ir; (4) 85% Pd, 10% Ru and 5% Rh. Heat-treatment is stated to increase the hardness.

Purification of Waste Gases

ENGELHARD INDUSTRIES INC. *British Patent 849,842*

Waste gases containing oxides of nitrogen are purified by contacting the gases, mixed with a gaseous hydrocarbon fuel, with a rhodium- or palladium-containing catalyst at at least 690°F. The catalyst may consist of palladium, palladium and rhodium, or palladium and/or rhodium mixed with another platinum group metal. An alumina support is used.

Photographic Screens

GRATICULES LTD. *British Patent 850,047*

A graticule or half-tone or gravure screen is made by forming a photographic image thereof of a platinum group metal in a collodion emulsion on a glass support, treating it with an aqueous solution of a soluble salt of tin, bismuth or lead and burning off the collodion.

Hydrogen Gauges

WESTINGHOUSE ELECTRIC CORP. *British Patent 850,064*

A hydrogen gauge includes a first conductor, the electrical resistance of which changes in response to changes in environmental hydrogen concentration, a second conductor exposed to the same environment, the resistance of which is not affected thereby, but having the same temperature coefficient of resistance as the first conductor, both conductors being insulated from one another and means for measuring the electrical resistance of each conductor or the differential resistance between them. The first conductor is formed of palladium and the second of platinum.

Electrical Contacts

METALS AND CONTROLS CORP. *British Patent 850,185*

One contact of a co-operating contact pair is composed of an alloy of 60-80% by wt. of palladium, 0.5-1.8% of nickel, cobalt or copper or mixtures thereof and remainder silver. The other contact consists of an alloy of 50-80% by wt. of gold and balance silver. The combination is stated to have an average life of three times those at present used in voltage regulators.

Purification of Gas Mixtures

IMPERIAL CHEMICAL INDUSTRIES LTD. *British Patent 850,760*

The amount of methyl-acetylene in propylene-rich gas is decreased by passing the gas, together with hydrogen, over a catalyst comprising 0.01% to 0.1% of palladium on gamma alumina. The catalyst is made by precipitating aluminium hydroxide from aluminium nitrate by addition of aqueous ammonia, separating, drying, calcining and pelleting to give pellets of gamma alumina and then impregnating them with an aqueous

solution of an appropriate palladium salt, followed by heating in hydrogen. See also No. 850,761 covering the production of propylene free from methyl acetylene.

Alloy for Spinning Nozzles

DEUTSCHE GOLD-UND-SILBER-SCHNEIDANSTALT
German Patent 1,075,838

A spinning nozzle is formed of an alloy composed of more than 32%, up to 93%, platinum, 0.05–2%, preferably 0.25–1%, rhenium and remainder gold.

Palladium Alloy for Spinning Nozzles

W. C. HERAEUS G.M.B.H. *German Patent 1,077,434*

The palladium- and iridium-containing alloy for making spinning nozzles for the production of artificial fibres, according to German patent No. 1,010,742, is modified so as to contain from 7% to less than 15% iridium, 5–30%, preferably 10–25%, rhodium and remainder palladium.

Alloy for Electrical Contacts

W. C. HERAEUS G.M.B.H. *German Patent 1,077,435*

A rhodium-nickel alloy containing 10–25%, preferably 12–21%, nickel, remainder rhodium, is used for making electrical contacts, particularly telephone selector contacts.

Hydrocracking Catalyst

PHILLIPS PETROLEUM CO. *U.S. Patent 2,946,739*

Wafra 400°F plus crude is hydrocracked at 750–850°F, a pressure of 500–3000 psig and a liquid hourly space velocity of 0.1–1, using 500–5000 cu. ft of hydrogen per barrel of oil with a catalyst containing 0.1–1 wt.% of rhodium, 1–5 wt.% of cobalt, 3–10 wt.% of molybdenum, on an alumina support.

Selective Hydrogenation and Catalyst therefor

CHEMETRON CORP. *U.S. Patent 2,946,829*

A catalyst for the selective hydrogenation of highly unsaturated hydrocarbons in a concentrated olefin stream is composed of 0.01–0.09 wt.% of palladium metal on an alumina support, the catalyst having a pore volume of surface pores of a threshold diameter not over 800Å, in the range of 0.6–0.4 cc/g and the palladium being mainly concentrated in the external portions of the carrier.

Catalyst

STANDARD OIL CO. *U.S. Patent 2,948,672*

A hydrocarbon conversion process is carried out using a platinum-alumina hydroforming catalyst of improved activity containing 0.05–1% by wt. of platinum, based on dry Al₂O₃, uniformly distributed in it. The catalyst is prepared by impregnating solid hydrous alumina containing 1–30% by wt. of combined water, dry basis, with a solution of a platinum compound in

amount to give the required amount of platinum, drying and calcining. Impregnation is effected in the presence of an aqueous solution of a halogen-containing aliphatic carboxylic acid having 2–5 carbon atoms in the molecule and an ionisation constant greater than 10⁻³ at 25°C in a molar ratio to alumina of 0.001–0.05.

Catalysts

STANDARD OIL CO. *U.S. Patent 2,950,243*

A hydroforming process is carried out with a platinum-alumina catalyst prepared by forming a mixture by commingling an alumina hydrosol with a solution consisting of water, ammonium hydroxide, or a water-soluble amine or a quaternary ammonium hydroxide, and a water-miscible oxygen-containing organic solvent (an alkyl alcohol, acetone, an alkyl glycol or an alkyl ether). Sufficient alkaline substance is used to adjust the pH of the mixture to 8.5–12; the solvent comprising 10–50% by vol. of the mixture. The mixture is held at 50–250°F for over 1 hour, whereby the alumina present is converted to a filterable slurry of solid hydrous alumina from which the alumina is separated and dried to a volatile content of 15–50% wet basis. The dried alumina is then impregnated with an aqueous chloroplatinic acid solution to a platinum level of 0.05–1% by wt., based on dry Al₂O₃, dried and calcined.

Platinum Catalyst

ESSO RESEARCH & ENGINEERING CO. *U.S. Patent 2,950,259*

In the manufacture of an alumina supported platinum catalyst activated by heat-treatment, the impregnated alumina is heated at at least 900°F for a suitable time to form platinum metal crystallite particles from the impregnating solution, the heat-treatment being controlled to keep the particles from growing to a crystallite size of over 50Å, as shown by an X-ray test.

Conversion of Petroleum

UNION CARBIDE CORP. *U.S. Patent 2,953,509*

The viscosity and boiling range of petroleum are reduced by gamma irradiating the petroleum with about 100 million röntgens from a cobalt 60 bomb in the presence of a catalyst of platinum oxide or palladium chloride.

Preparing Beta-Phenyl-Ethylchlorosilanes

UNION CARBIDE CORP. *U.S. Patent 2,954,390*

Beta-phenyl-ethylchlorosilanes are produced by forming a mixture of styrene, a chlorosilane containing at least one hydrogen atom bonded to silicon, tetrahydrofuran in amount from 0.5 to 10 times the weight of styrene, and a catalyst consisting of chloroplatinic acid, platinum or platinum on an inert carbon-free carrier, and heating the mixture to cause addition of the chlorosilane to the styrene.