

ductance down to 10^{-8} H. The total amount of Pt transferred is comparable with the volume of the molten metal bridge, while the Pd transferred is only a fraction of the bridge.

GLASS TECHNOLOGY

Influence of Platinum Nucleation on Constitution of and Phase Separation in Sodium Phosphate Glasses

M. K. MURTHY, *J. Amer. Ceram. Soc.*, 1961, **44**, (8), 412-417

Sodium phosphate melts containing 0.0038, 0.0076, 0.038, and 0.15% Pt were prepared in Pt crucibles. Paper chromatographic and electron-microscopic techniques were used to study the resultant glasses with n , the number average chain length, varying from 3 to 9. It appears that Pt nucleation has no effect on the distribution of

polyphosphates in the glasses, although phase separation occurs. The results are discussed in relation to immiscibility phenomena.

Fundamentals of Glass-to-Metal Bonding VII. Wettability of Iron by Molten Sodium Silicate Containing Iron Oxide

R. B. ADAMS and J. A. PASK, *J. Amer. Ceram. Soc.*, 1961, **44**, (9), 430-433

Contact angles and adherence on Pt and Fe of $\text{Na}_2\text{Si}_2\text{O}_7$ glasses with additions of 0.0, 2.40, 4.77, 9.10, 16.7, 28.5, and 44.4 mole% Fe were studied in vacuum at 1000°C. Fe additions have no effect on the contact angles or the adherence in the glass-Pt system. No devitrification was observed in the glass-Pt system. In the glass-Fe system, with increasing Fe content in the glass, the contact angle decreases and the adherence increases. Devitrification occurs in the glass-Fe system with glasses containing 9.10 mole% Fe and higher.

NEW PATENTS

Production of Hydrocyanic Acid

DEUTSCHE GOLD-UND SILBER-SCHNEIDANSTALT
British Patent 875,393

Hydrocyanic acid is made by reacting a hydrocarbon with ammonia in the presence of a catalyst composed of up to 5% by wt. of platinum, palladium, iridium and/or rhodium, up to 100 at.% (based on total platinum metal content) in total of copper, nickel, aluminium and/or silicon and an oxygen, nitrogen and/or carbon compound of an alkaline earth metal, boron, aluminium or silicon.

Oxidation-reduction Potential Measurement

DIAMOND ALKALI CO. *British Patent 875,440*

Apparatus for measuring the oxidation-reduction potential produced in reactions involving chlorine includes a unitary cell body of electrically non-conductive material in the surface of which are embedded two electrodes, one having a surface of silver and the other a surface of platinum, both surfaces being flush with the cell body surface.

Production of Hydrogen Peroxide

FOOD MACHINERY & CHEMICAL CORP. *British Patent 875,850*

In the production of hydrogen peroxide by the alternate reduction and oxidation of an alkylated anthraquinone dissolved in a solvent, reduction is carried out by contacting the working solution with hydrogen in the presence of a fixed bed of metallic catalyst having a specific particle size of 4-100 U.S. standard mesh, the working solution being passed through the bed at a rate of 20-200

l/min/sq. ft of catalyst bed cross-section. The catalyst may be palladium, ruthenium, platinum or rhodium.

Manufacture of Aldehydes and Ketones

CONSORTIUM FÜR ELEKTRO-CHEMISCHE INDUSTRIE G.m.b.H. *British Patent 876,024*

Aldehydes and ketones are made by passing an olefin, together with oxygen, over a catalyst containing a compound of a platinum group metal, preferably palladium, in the presence of steam. The catalyst may be supported on active carbon, an acidic substance being added to enhance the activity of the catalyst.

Manufacture of Carbonyl Compounds

CONSORTIUM FÜR ELEKTRO-CHEMISCHE INDUSTRIE G.m.b.H. *British Patent 876,025*

Carbonyl compounds are made by contacting an olefinically unsaturated hydrocarbon with an aqueous solution containing a platinum group metal compound at 0-200°C in the presence of an oxidising agent having an oxidation potential greater than that of the platinum metal compound. Rhodium or palladium may be used.

Production of Hydrogen Peroxide

FOOD MACHINERY & CHEMICAL CORP. *British Patent 876,459*

A fixed catalyst bed composed of 0.1-2% by wt. of palladium, supported on α -alumina, magnesium oxide, calcium carbonate, silicon carbide or magnesium carbonate, is used in the production of hydrogen peroxide by alternate reduction and oxidation of an alkylated anthraquinone. The

catalyst support has a surface area of less than 5 sq. m/g and a pore volume as to pores of less than 800 Å of less than 0.03 c.c./g.

Thermocouples

JOHNSON, MATTHEY & CO. LTD. *British Patent* 876,553

Each limb of a thermocouple for use under neutron irradiation conditions is formed of a platinum-molybdenum alloy, one alloy having a higher molybdenum content than the other, e.g. one alloy contains 3-6% molybdenum and the other 0.1-1% molybdenum.

Isomerisation Process

UNIVERSAL OIL PRODUCTS CO. *British Patent* 876,462

In a process for isomerising a hydrocarbon, use is made of a catalyst comprising a composite of alumina and platinum on to which aluminium chloride has been vaporised.

Flameless Reaction of Gaseous Hydrocarbons

BADISCHE ANILIN-& SODA-FABRIK A.G. *British Patent* 877,359

A catalyst of platinum on α -Al₂O₃ (prepared from platinum chloride solution) is used in the first stage of a two-stage process of continuous reaction of sulphur-containing gaseous hydrocarbons with oxygen, in insufficient amount for complete combustion, in which part of the hydrocarbon is burned over this catalyst and the remainder reacted with steam and carbon monoxide.

Production of Dicyanogen

ROHM & HAAS G.M.B.H. *British Patent* 877,684

Dicyanogen is prepared by passing hydrogen cyanide at elevated temperature (300-800°C) over a catalyst comprising one or more of the following metals and/or metal oxides, i.e. Group VIa metals and the platinum metals and oxides of Group IVa, Va and VIa.

Electrodes

IMPERIAL CHEMICAL INDUSTRIES LTD. *British Patent* 877,901

An electrode structure for use in electrolysis and cathodic protection is formed of a support, the surface of which consists of titanium or a titanium base alloy and a platinum group metal (or alloy) in contact with part or all of the surface. The structure may comprise pure titanium electroplated with platinum or rhodium or the latter may be bolted or spot-welded to the titanium.

Manufacture of Aldehydes and Ketones

CONSORTIUM FÜR ELEKTRO-CHEMISCHE INDUSTRIE G.M.B.H. *British Patent* 878,777

Carbonyl compounds are produced by contacting an olefinically unsaturated hydrocarbon and oxygen with an aqueous solution containing a

compound of a platinum group metal and a salt of a polyvalent transition metal (other than a platinum group metal) as well as halogen ions at up to 200°C. The amount of halogen, e.g. chlorine, ions present is from 60% to below 100% of the value obtainable if all the metal salts were present in their highest stable oxidation form as halide. A palladium compound and a copper salt are preferably used.

Organic Platinum-bearing Liquids

THE INTERNATIONAL NICKEL CO. (MOND) LTD. *British Patent* 878,822

A metal-bearing liquid is formed by reacting a halogen acid of platinum with di-iso-propyl ether. Chloroplatinic acid is used, a dark brown liquid resulting having the empirical formula $[(C_3H_7)_2O]_2 H_2 Pt Cl_6$.

Treatment of Gases

ENGELHARD INDUSTRIES INC. *British Patent* 879,209

A method of obtaining purified gases by combustion reactions of oxygen-containing gases consists in contacting a mixture of the gases and a hydrocarbon fuel (ethane, propane, ethylene, acetylene or benzene) with a catalyst of platinum or ruthenium metal at reaction temperature. 0.1-2% by wt. of the catalyst metal supported on alumina, silica, silica gel or diatomaceous earth is used.

Method of Making Wire

ENGELHARD INDUSTRIES INC. *British Patent* 880,441

Wire is made by securing in the form of a bundle a number of chemically cleaned pure platinum wires, heat-treating, e.g. fritting, the bundle at above the recrystallisation temperature of the platinum until the wires are combined into a rod by partial fusion, reducing the cross-section of the rod, e.g. by hot-rolling, to form a solid metal mass and cold-working, e.g. drawing, the rod into wire. Intended for use as thermocouple wire or furnace windings.

Treating Lower Alkanes

S. L. RUSKIN *British Patent* 881,491

Lower alkanes, e.g. methane, ethane, propane or butane, are converted to liquid hydrocarbons by exposing them to 25-100 million Röntgen units of gamma radiation per g of substance in the presence of a catalyst, which may be platinum oxide.

Treatment of Petroleum

D. RUSKIN et al. *British Patent* 881,492

Crude petroleum oils and residues from refining crude oils are irradiated by exposure to 50-400 million Röntgen units of gamma radiation per g of substance in the presence of catalytic amounts of platinum oxide or palladium chloride.

Production of Cyclohexylamine

ABBOTT LABORATORIES *British Patent* 881,512

Cyclohexylamine is made by reacting aniline with hydrogen under pressure in the presence of a rhodium or rhodium oxide catalyst at 25–200°C. 0.05–40% by wt., preferably 5%, of elemental rhodium on an inert carrier is used.

Assemblies Comprising Titanium

IMPERIAL CHEMICAL INDUSTRIES LTD. *British Patent* 881,625

In producing an electrical contact between titanium and graphite, the titanium surface is first coated with a platinum metal. Electrodeposited platinum or rhodium is stated to give an electrical contact resistance for titanium to graphite of the same order as that of graphite to graphite.

Rendering Metals Resistant to Embrittlement under Action of Hydrogen in Aqueous Electrolytes

UNION CARBIDE CORP. *French Patent* 1,248,339

Tantalum, columbium, vanadium, alloys of tantalum and titanium, alloys of titanium and manganese, stainless steel or effervescent or rimmed steel are rendered resistant to embrittlement under the action of hydrogen in aqueous media by combining with the basis metal or alloy, a platinum group metal, gold or rhenium or an alloy of any of these metals. Any of the following procedures may be used: partially coating the surface of the basis metal or alloy with the noble metal; spot welding the noble metal or alloy to the surface of the basis metal; rubbing the noble metal or alloy on the surface of the basis metal so as to deposit a powder thereon; or, adding to the aqueous medium containing hydrogen one or more salts of the noble metals.

Preventing Embrittlement of Metals exposed to Aqueous Electrolytes

UNION CARBIDE CORP. *French Patent* 1,248,340

Tantalum, alloys of tantalum and titanium and stainless steels are rendered resistant to embrittlement by hydrogen by alloying with the metal 0.05–5% by wt. of a platinum group metal, gold or rhenium or alloys thereof. The alloying addition preferably constitutes 0.4–0.5% by wt. of the total. Claims also the alloy *per se*.

Oxidation-resistant Alloy

GENERAL ELECTRIC CO. *U.S. Patent* 2,994,604

An alloy consists of 0.6–3% by wt. of yttrium, 35–50% by wt. of chromium, 0.5–1% by wt. of palladium and balance iron.

Preparation of Anodes

ENGELHARD INDUSTRIES INC. *U.S. Patent* 2,998,359

Anodes for cathodic protection systems are made by electroplating a titanium or tantalum base with platinum, roughening the plated surface, spraying on additional platinum to form a dis-

continuous coating, burnishing the sprayed surface to form an electrode, which is then immersed in an electrolyte as an anode and a voltage applied to form an oxide layer on those portions of the electrode not completely coated with platinum.

Catalyst Compositions

UNIVERSAL OIL PRODUCTS CO. *U.S. Patent* 2,999,074

A catalyst composition consists of a calcined and reduced composite of a refractory oxide containing chemically combined hydroxyl groups and 0.01–2% by wt. of a platinum group metal.

Preparation of Adiponitrile

E. I. DU PONT DE NEMOURS & CO. *U.S. Patent* 2,999,107

1,4-dicyanobutene isomers in the liquid phase are hydrogenated to adiponitrile by reacting the butenes with hydrogen under pressure of 4–1000 atmospheres in the presence of from 0.001–1% by wt., based on wt. of the butene calculated as metallic rhodium, of a rhodium catalyst, consisting of rhodium halide, rhodium chelate or rhodium carbonyl halide, at 25–150°C.

Catalyst

AMERICAN CYANAMID CO. *U.S. Patent* 3,000,813

A platinum-alumina catalyst used for reforming petroleum hydrocarbons and containing 0.05–1% of platinum and 2.5% of aluminium chloride on the dry wt. of the catalyst is made by impregnating a dry aged alumina, capable of conversion to η -alumina upon calcination, with a platinum compound and aluminium oxide and then pelletising the mixture and calcining the pellets.

Reforming Catalyst

AMERICAN CYANAMID CO. *U.S. Patent* 3,000,838

Platinum-alumina catalysts having high activity and low fluorine content are improved by impregnating aged alumina sol, constituting 20–80% of the Al_2O_3 content of the final composition, with fluoride sufficient to add 0.1% to less than 0.6% of fluoride by wt., mixing this impregnated sol with untreated dry aged alumina sol, constituting 80–20% of the Al_2O_3 content, mixing this mixture with a solution of a platinum compound so as to provide 0.05–1% of platinum, based on wt. of final composition, drying, pelleting and calcining the pellets.

Hydrogenation of Naphthalene

SINCLAIR REFINING CO. *U.S. Patent* 3,000,983

A catalyst composed of 0.1–2% by wt. of platinum on activated alumina is used in a process of hydrogenating naphthalene in the presence of free hydrogen by contacting the naphthalene in vapour phase with the catalyst at 400–700°F, pressures from atmospheric to 700 p.s.i. and a WHSV of 0.1–4 to produce decalin or at 550–700°F, pressures of 100–500 p.s.i. and a WHSV of 10–20 to produce tetralin.