

### **Suction Pyrometers in Theory and Practice**

T. LAND and R. BARBER, *J. Iron Steel Inst.*, 1956, 184, Nov., 269-273

The factors to be considered in designing an efficient suction pyrometer are discussed. A commercially available instrument is described comprising a Pt:Pt-13%Rh thermocouple surrounded by radiation shields and incorporating

devices for controlling and measuring the velocity of the gas. The optimum velocity is shown to be about 500 ft./sec. and the efficiency at various temperature levels is maintained by altering the number of radiation shields; it has been found advantageous to enclose these in a water-cooled jacket for use in open-hearth furnace uptake where there is a danger of overheating and slag attack.

## **NEW PATENTS**

### **Reductive Alkylation of Organic Compounds**

UNIVERSAL OIL PRODUCTS CO. *British Patent* 753,740

An organic compound having an amino or nitro group substituent is reacted, together with a ketone or aldehyde and hydrogen in the presence of a platinum-containing catalyst (not over 2% by weight Pt).

### **Dehydroisomerisation of Naphthenes**

N.V. DE BATAAFSCHE PETROLEUM MAATSCHAPPIJ *British Patent* 753,783

C<sub>5</sub> ring naphthenes are converted to the corresponding aromatic hydrocarbons by treatment, in the presence of hydrogen, at 420°C to 570°C, with a catalyst having a surface area greater than 300 sq. metres/gram and consisting of silica gel promoted with 0.1-0.8% alumina and 0.1-1% platinum.

### **Hydroforming**

ESSO RESEARCH & ENGINEERING CO. *British Patent* 754,041

Hydroforming is carried out with the use of a fluidised desulphurisation catalyst which absorbs the sulphur removed and gives an H<sub>2</sub>S-free naphtha product.

### **Hydroforming Catalyst**

ESSO RESEARCH & ENGINEERING CO. *British Patent* 754,552

A hydroforming catalyst consists of 0.01-2% by weight of finely divided metallic platinum or 0.5-5% finely divided palladium supported on pure crystalline alumina. The alumina is prepared by heating beta alumina trihydrate to 750-1500°F. The catalyst is made by impregnating the crystalline alumina with a solution of a platinum or palladium salt, drying and calcining.

### **Recovery of Platinum from Catalytic Materials**

AMERICAN CYANAMID CO. *British Patent* 755,487

Platinum-alumina catalytic material is digested with sulphuric acid. The alumina goes into solution and platinum remains in suspension. The platinum is flocculated and separated.

### **Cyclisation of Pentamethylene Diamine**

IMPERIAL CHEMICAL INDUSTRIES LTD. *British Patent* 755,534

Piperidine is made by contacting pentamethylene diamine in vapour state at elevated temperature (300-500°C) with a catalyst consisting of platinum (5%) on pellets of silica gel. An inert gas is preferably passed through the reaction zone.

### **Reforming of Gasoline Fractions**

UNIVERSAL OIL PRODUCTS CO. *British Patent* 755,709

A gasoline fraction containing arsenic impurities is first freed of impurities by contact with an initial portion of a noble metal catalyst at 125-425°C and is then reformed during contact with another portion of the catalyst at 440-650°C. Catalyst comprising alumina, 0.1-8% of fluorine or chlorine and 0.1-1% platinum is referred to.

### **Electrical Contacts**

JOHNSON, MATTHEY & CO. LTD. *British Patent* 756,393

A rivet-type electrical contact is made from a disc-like blank. A hollow shank is formed by extruding part of the material of the blank, the remaining unextruded part forming the contact operating face. The blank may consist of solid metal, such as platinum or palladium, or of bi-metal, i.e. a base metal backing, e.g. copper, and a precious metal facing layer.

### **Hydroforming**

ESSO RESEARCH & ENGINEERING CO. *British Patent* 756,798

A hydroforming process in which the treated material, withdrawn from the hydroforming zone, is fractionated and the part boiling between 225°C and 300°C is recycled to the hydroforming zone. A platinum group metal-on-alumina catalyst is used, e.g. 0.05-5% platinum or 1.5-10% palladium by weight.

### **Platinum Catalysts**

N.V. DE BATAAFSCHE PETROLEUM MAATSCHAPPIJ *British Patent* 756,902

A platinum catalyst includes also a minor portion each of aluminium fluoride and aluminium

borofluoride. The combined effect results in a considerably higher activity than is obtained with the standard halogen promoters or with either agent alone. Comparative tests are given.

### Electrically Conductive Article

LIBBEY-OWENS-FORD GLASS CO. *British Patent 757,072*

A platinum group metal is used in forming an electrically conductive article having a light transmission of at least 50%. The article, such as a window, consists of a glass body carrying a continuous layer formed of an intimate molecular mixture of metal and an oxide, sulphide, selenide or telluride. The metal used may be platinum, palladium or rhodium.

### Cracking of Heavy Hydrocarbon Oils

UNIVERSAL OIL PRODUCTS CO. *British Patent 757,365*

Discloses a method of catalytically converting heavier-than-gasoline hydrocarbon oils into motor fuel which avoids the objectionable features of prior processes, as regards optimum use of hydrogen present in the charge stock and low tolerance for charge stock contaminants, which seriously affect the activity of the catalyst. The process involves a cracking reaction in presence of hydrogen fluoride and a reforming step. Platinum group metal catalysts are used in the reforming step: e.g. a refractory oxide and platinum or palladium.

### Electrolytic Process

ROHM & HAAS CO. *British Patent 757,928*

Platinum electrodes are used in an electrolytic process of separating alkali metal ions from ions of zinc and/or aluminium.

### Thermionic Valves

THE M-O VALVE CO. LTD. *et al. British Patent 758,099*

In a thermionic valve of the kind having a cathode comprising alkaline earth metal compounds in a molybdenum container, the active portion of the cathode, which consists of sintered tungsten, being welded to the molybdenum container, the inner surface of the container is coated with a layer of platinum, rhodium or iridium to prevent reaction of the alkaline earth metal compounds with the molybdenum during welding.

### Thermionic Cathodes

THE GENERAL ELECTRIC CO. LTD. *et al. See M-O VALVE CO. LTD. British Patent 758,099*

### Aromatisation and Naphtha Reforming

ESSO RESEARCH AND ENGINEERING CO. *British Patent 758,680*

A platinum group metal catalyst may be used in a method of converting aromatisable hydrocarbon

material by contacting the material in the presence of added hydrogen at elevated temperature, withdrawing the contaminated catalyst, which is heated to burn off carbonaceous deposits and then passed to a purging zone for treatment with gas containing hydrogen and 45 vol.% of a gaseous hydrocarbon to remove water.

### Spinning Nozzles

W. C. HERAEUS G.M.B.H. *British Patent 758,507*

A spinning nozzle is made of an alloy composed of 10-30% iridium and remainder platinum. Up to 5% of other platinum group metals may be included, preferably rhodium and palladium.

### Purifying Acrylonitrile

MONTECATINI SOC. GEN. PER L'INDUSTRIA MINERARIA E CHIMICA *British Patent 758,577*

A supported platinum or palladium catalyst is used in a process of purifying acrylonitrile containing acetylene polymers by hydrogenation at temperatures of 0-50°C in a hydrogen atmosphere and a pressure of 1-20 Atm, pure acrylonitrile being separated from the product by fractional distillation.

### Welding Contacts to Wires

WESTERN ELECTRIC CO. INC. *British Patent 759,076*

Discloses apparatus for welding contacts on to the ends of wires mounted in a row on an electrical relay component. The contacts may be made from contact tapes of composite material, e.g. a body of nickel-silver coated with a thin layer of palladium either on the upper surface, the under surface or both upper and under surfaces.

### Analytical Electrodes

JOHNSON, MATTHEY & CO. LTD. *British Patent 759,288*

An electrode for electrochemical analysis of the kind comprising a perforated cylindrical or flat electrode member mounted in a cylindrical or rectangular metallic frame, has the electrode formed of expanded metal, preferably of platinum or other platinum group metal or alloy.

### Catalytic Conversion of Hydrocarbon Oils

N.V. DE BATAAFSCHE PETROLEUM MAATSCHAPPIJ *British Patent 759,310*

In the conversion of a hydrocarbon oil in vapour phase using a long narrow reaction zone and a separate catalyst regeneration zone, regenerated catalyst is introduced into the vapours near the inlet end of the reaction zone and intermediately. Suspended catalyst is separated at a point between the positions and at a point near the outlet end. A supported platinum catalyst may be used.

### Hot Air Generator

GAZ ET CHALEUR *British Patent 759,520*

Air heating apparatus comprises a heating chamber having a catalytic combustion heating

element and an air flow duct conveying the air past the wall of the chamber so that the air is heated by indirect heat exchange. The heating element consists of a grid or other perforated member provided with a platinum catalyst.

### Grid for Electric Discharge Tubes

STANDARD TELEPHONES & CABLES LTD. *British Patent 759,552*

A metal grid is made by winding a support frame with a jacketed metal wire and then removing the jacket from part at least of each turn of the winding. The wire may be Wollaston wire with a core of gold, platinum or aluminium and a jacket of silver. Jacket removed chemically or electrolytically.

### Heat Treatment of Metal Catalysts

G. STETTER *British Patent 760,413*

Two-dimensional, net-like catalysts of platinum or platinum alloys, e.g. platinum-rhodium catalysts as used for ammonia oxidation, are given a microcrystalline structure by heating the catalyst by passage of electric current through it while protecting it from heat losses by conduction or radiation by placing the catalyst between heat insulating masses (fireproof metal oxides or asbestos) adjacent to, but not in contact with, it. The surfaces of the insulating masses may be coated with platinum.

### Hydroforming

ESSO RESEARCH & ENGINEERING CO. *U.S. Patent 2,746,909*

The invention concerns a method of hydroforming naphtha with use of a platinum group metal catalyst and is of the regenerative type. The hydroforming zone is operated at about 200 lb. pressure.

### Preparing Platinum-Alumina Catalysts

ESSO RESEARCH & ENGINEERING CO. *U.S. Patent 2,746,937*

Platinum-alumina or palladium-alumina catalysts are made by mixing platinum or palladium with an alumina hydrosol prepared by treating aluminium metal with a dilute acid in presence of a catalytic amount of mercury and drying and calcining the product.

### Hydrogenation of Dicyanobutene

E.I. DU PONT DE NEMOURS & CO. *U.S. Patent 2,749,359*

Relates to production of adiponitrile in a hydrogenation reaction employing a palladium-on-coconut-charcoal catalyst. A gaseous mixture of 1,4 dicyanobutene and 10-100 mols of hydrogen per mol of the material is passed at a pressure of 0.5-5 atoms at 200-350° C into contact with the catalyst.

### Reforming Catalysts

ATLANTIC REFINING CO. *U.S. Patent 2,750,329*

A reforming catalyst is made by contacting a cracking component silica and zirconia, magnesia, alumina and/or thoria with an aqueous solution of a platinum or palladium compound, subjecting the component and solution with constant moisture content to a temperature and for a time sufficient to fix at least 50% of the metal deposited on the component, drying and reducing the metal compound to the metal.

### Reforming Catalyst

HOUDRY PROCESS CORP. *U.S. Patent 2,751,333*

A dehydrogenation and isomerisation catalyst is composed of 0.05-2% by weight platinum on an activated alumina which has been acid treated with an organic carboxylic acid.

### Low Pressure Hydrogenation

ESSO RESEARCH & ENGINEERING CO. *U.S. Patent 2,757,128*

The invention concerns the treatment of gasoline hydrocarbons to improve their lead susceptibility, their stability and to reduce the sulphur content of raw gasoline fractions. The material is fed together with hydrogen to a zone containing a fluidised bed of hydrogenation-dehydrogenation catalyst (platinum-on-active alumina and containing some HF).

### Hydroforming Process

ESSO RESEARCH & ENGINEERING CO. *U.S. Patent 2,758,062*

In a two-stage hydroforming process for hydrocarbon fractions, a platinum- or palladium-on-alumina catalyst is employed in the first stage and a Group VI metal oxide or sulphide catalyst in the second stage.

### Regeneration of Hydroforming Catalysts

ESSO RESEARCH & ENGINEERING CO. *U.S. Patent 2,758,063*

A continuous hydroforming process using a platinum-containing catalyst is effected by passing hydrocarbon vapours and hydrogen-containing gas through a bed of finely divided platinum-containing alumina particles at a pressure such that coke or carbonaceous material is deposited. The particles are treated with a hydrogen-rich recycle gas free of C<sub>4</sub> and higher hydrocarbon at hydroforming pressure and temperature long enough to remove the coke or carbonaceous material and thus reactivate the catalyst, which is then reused.

### Reforming of Gasoline Fractions

UNIVERSAL OIL PRODUCTS CO. *U.S. Patent 2,758,064*

In a reforming process using a catalyst comprising platinum, alumina and combined halogen, in which one or more of the catalyst components is

deactivated by excess sulphur and nitrogen, such deactivation is prevented by hydrogenating and hydrocracking the charge in the presence of hydrogen and a hydrogenating catalyst and converting the sulphur and nitrogen contaminants into hydrogen sulphide and ammonia, which can be separated and removed.

### Conductors

E.I. DU PONT DE NEMOURS & CO. *U.S. Patent 2,758,267*

An electric device comprises a silver conductor element of positive polarity and a conductor of negative polarity on which silver can deposit. Both conductors are arranged on a dielectric with a barrier composed of gold, platinum or palladium on the dielectric between the conductors and spaced from the negative polarity conductor.

### Hydrocarbon Conversion Catalysts

UNIVERSAL OIL PRODUCTS CO. *U.S. Patent 2,759,897*

A catalyst is made by commingling a solution of a platinum compound with alumina in amount to form a catalyst containing 0.01-10% platinum and calcining the composition at 700-1100°F in an atmosphere of air containing at least 0.01578 lb. of water per lb. of dry air.

### Production of Hydrogen and Carbon

HOUDRY PROCESS CORP. *U.S. Patent 2,760,847*

In the production of hydrogen and carbon from gaseous hydrocarbons by contacting the charge at 1200-2000°F with an atomised stream of molten metal contact material, the contact material contains 1-10% by weight of the molten metal of a dehydrogenisation catalyst, e.g. of platinum.

### Catalyst Reactions

E. F. SCHWARZENBEK *U.S. Patent 2,760,912*

A naphtha fraction is contacted under suitable reforming conditions with a catalyst composed of platinum or palladium supported on a porous carrier. The catalyst is made by combining a hydrous carrier material, an ammine complex of platinum or palladium and a water-soluble promoter, e.g. an alcohol or a ketone. The mixture is heated to decompose the ammine complex.

### Catalysts

M. W. KELLOG CO. *U.S. Patent 2,760,940*

A platinum or palladium catalyst for hydrocarbon conversion is prepared by combining a hydrous

carrier material, an ammine complex of platinum or palladium and a water-soluble promoting agent (alcohol or ketone) and heating the mixture to decompose the compound and leave a metal residue on the porous carrier.

### Composite Metal Rod

BAKER & CO. INC. *U.S. Patent 2,761,207*

A composite metal rod is made by anodising a refractory core and telescoping it into a platinum metal sheath, the inner surface of which has been etched. A portion of the sheath extends beyond the core and is gripped for snug-fitting the sheath to the core. The extension is removed and the composite rod hot swaged with progressive reduction of cross-sectional area under progressively reduced temperatures.

### Catalytic Conversion of Hydrocarbons

ESSO RESEARCH & ENGINEERING CO. *U.S. Patent 2,761,819*

A hydrocarbon is contacted at 850-1000°F in the presence of hydrogen to convert it to a higher octane number with a platinum-alumina catalyst which has previously been treated with hydrogen at 1000-1300°F for 2-24 hours.

### Platinum Catalyst

SHELL DEVELOPMENT CO. *U.S. Patent 2,762,781*

A catalyst consists of an inert carrier incorporating 0.05-1% platinum with 0.03-0.4 mole per kilogram each of aluminium fluoride and aluminium borofluoride as acidic promoters.

### Silica-Alumina Catalyst

UNIVERSAL OIL PRODUCTS CO. *U.S. Patent 2,763,623*

A synthetic silica-alumina cracking component is heated at 900-1800°F in presence of steam until the cracking activity is reduced below 50% of the original. Platinum, 0.01-2.5% by weight, is then composited with the product.

### Catalyst Regeneration

ESSO RESEARCH & ENGINEERING CO. *U.S. Patent 2,764,528*

A spent platinum-alumina hydroforming catalyst is regenerated by suspending it in a high boiling naphthenic oil, hydrogenating the suspension for 10 secs. to 10 mins. at a hydrogen partial pressure of 1,000-10,000 lb./sq. in. at 600-900°F, replacing the oil, after settling, by washing the suspension with an equal volume of a low boiling saturated wash oil in a hydrogen atmosphere at below 500°F and removing the oil by drying in a hot hydrogen atmosphere.