glycol solution to solvent-extract aromatics and light high-octane paraffins.

Manufacture of Platinum Reforming Catalysts

Each platinum atom in a petroleum reforming catalyst is required to perform a tremendous catalytic feat. In addition, although constituting less than 1 per cent of the catalyst, the platinum must maintain this active and selective performance over the entire time it is in a reforming unit. It is not uncommon to have a catalyst life of two years or more, so that on average each platinum atom has catalysed the conversion of more than twenty million hydrocarbon molecules. The platinum cannot perform in this way if it is inaccessible, or poisoned, or in too large crystallites, or in a position which makes it ineffective against coke formation.

The following factors influence the activity of a platinum reforming catalyst, and their accurate control has been the subject of much study and very numerous patent applications:

(*a*) Platinum concentration and distribution

(*b*) Phase-type of alumina support, its specific surface, density and pore-characteristics

(*c*) The nature and concentration of halogen or other additive which serves to modify the acidity of the support

(*d*) The manner in which the support is prepared and by which it is impregnated with platinum and halogen

(*e*) The particle size, shape and bulk density of the finished catalyst.

The platinum concentration is a critical factor in determining catalyst costs, and concentrations from 0.3 to 1.3 per cent are usual. Increasing the platinum concentration raises the aromatics production by raising somewhat the dehydrogenation activity (not in direct proportion).

The paper concludes with a survey of the extensive patent literature relating to platinum reforming catalysts and their manufacture and some notes on the methods of recovering platinum from spent catalysts—a subject vital to the economics of platinum reforming. The full paper (published in *Chemistry and Industry*, 1960, 1454 – 1472) includes 280 references to the literature.

Cathodic Protection of Water Heaters

USE OF PLATINUM-PROTECTED TITANIUM ANODES

The short life, due to corrosion, of galvanised iron domestic water tanks has led to the development of glass-lined water heaters in the United States. Less serious tank corrosion caused by small holes in the glass linings may be controlled by the use of a cathodic protection system requiring a small impressed current. The design of such a system is discussed in a recent paper by H. C. Fischer of the Thermo-Craft Corporation, New York (*Corrosion*, 1960, **16**, (9), 9–17).

It has been found that the bare area of a single-coated, glass-lined tank may be protected adequately by a current of 5 milliamperes even in waters of high resistance. The presence in the system of copper ions derived from copper plumbing gives rise to local cell corrosion which renders magnesium and zinc anodes unsuitable. However, at the low current densities required, non-sacrificial anodes of bare titanium or titanium wound with platinum-clad tantalum ribbon have proved both effective and economic. One anode described consists of a 30-inch titanium wire, 0.051 inch in diameter, around which is wrapped a 0.002 by 0.008 by 36-inch platinum-clad tantalum ribbon. Field trials are being conducted using platinum-plated titanium wire anodes which have proved satisfactory in preliminary tests.

Cathodic protection has been found effective for glass-lined domestic water tanks heated either electrically or by gas. Power for the impressed current system for gas water heaters is supplied by a thermo-electric generator. In this case, in order to keep the anode voltage as low as possible, only platinum-plated titanium or the platinum-tantalum-titanium anodes may be used.