platinum, are attractive from the standpoints of stiffness (as shown by its extremely high modulus of elasticity) and creep. Allen and Carrington (6) carried out a series of compression creep tests on metals of high melting point. The strength at 1000°C was assessed by measuring the stress needed to give 1 per cent deformation in 24 hours. The value obtained for iridium was 6 tons per square inch compared with approximately 0.1 ton for platinum, 0.3 tons for palladium and 3 tons for rhodium. Of the base metals examined only tungsten, which has the disadvantage of being easily oxidised at these temperatures, had a strength comparable with that of iridium.

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The Catalytic Oxidation of Ammonia

A STUDY OF THE REACTION KINETICS

Among the papers presented to the first European Symposium on Chemical Engineering, held last year in Amsterdam, was a contribution on the catalytic oxidation of ammonia by means of a rhodium-platinum alloy gauze by Dr. A. P. Oele, of the Dutch State Mines (*Chemical Reaction Engineering*, Pergamon Press, London, 1958, pp. 146–157).

The process was studied as a typical fast heterogeneous reaction conducted in an adiabatic reactor. The main oxidation reaction is accompanied by side reactions leading to the decomposition of ammonia and nitric oxide, but these can be suppressed by employing suitable working conditions. The feed gas normally contains between 8 and 11 per cent of ammonia, and it flows through the flat circular platinum or rhodium-platinum gauzes which have a large area per unit of weight and which are set as close together as possible.

Within the usual range of ammonia concentration, the physical transport of ammonia molecules to the gauze surface is the principal rate-determining factor. The transport distance is very short, and the ammonia transport may be considered as a stationary diffusion process in a laminar flow. A calculation of the mass transfer may be made by using an empirical formula for flow perpendicular to the wires. The resulting data agree fairly well with the practical results, and it is possible to determine by relatively simple calculation most of the design data for a burner using a given type of gauze at a chosen gas loading.

The remaining factors may be determined by making a rough examination of the temperature distribution. When there is thermal equilibrium the heat evolved, which is determined by the heat of combustion and the local ammonia concentration for each unit area of gauze, is equal to the heat released by radiation and convection.

The optimum operating conditions in relation to platinum loss are also considered. These losses constitute a significant element in the costs of the process and may range from 200 to 2000 mgm. per ton of nitrogen throughput. Observation and calculation indicate that minimum losses may be realised by limiting the gas load and temperature and by using a pad of not more than five gauzes.