the helpful paper by J. W. Geus, V. Ponec, E. K. Poels and R. Koolstra from the State University Leiden and the State-University Utrecht, the role of the basic element is still far from clear.

There is still considerable interest in improving the selectivity of the partial reduction of alkynes and alkadienes catalysed by palladium. J. P. Boitiaux, J. Cosyns and G. Martino at the Institut Français du Pétrole showed that selective poisons such as carbon monoxide and pyridine are effective in improving the alkene yield from reactants such as acetylene or isoprene. The selective dechlorination of polychloroanilines to 3,5-dichloroaniline can be controlled by the addition of hydrochloric acid.

The texts of the plenary lectures and papers are now published by Elsevier as Volume 11 of their 'Studies in Surface Science and Catalysis' series. Unfortunately the discussion of the papers could not be incorporated in it, the editors preferring to publish the texts at the earliest opportunity. The volume will however be read with interest by all concerned with the structure and behaviour of supported metal catalysts.

The Recovery of Hydrogen from Waste Gas

Hydrogen can be purified to the very high standard required by the semiconductor and other advanced technology industries by the use of silver-palladium diffusion membranes through which the hydrogen can pass rapidly, while the membranes form a barrier to any other gases present in the input hydrogen. The HM2 diffusion unit illustrated here can produce 28 cubic metres of 99.99995 per cent hydrogen operating at a temperature of 300°C and an input pressure of 21 bars of commercial grade cylinder hydrogen; the electrical control cabinet is not shown, being separate from the hydrogen gas system. Lower outputs result if a reduced input pressure is used or if the feedstock has a lower hydrogen content. In practice hydrogen can be separated from cracked ammonia, cracked methanol or hydrogen-rich hydrocarbon gas streams.

Using a Johnson Matthey Equipment HM4 unit, Texaco U.K. are now recovering hydrogen from a waste stream containing 25 per cent hydrogen and 25 per cent methane, which was formerly vented to the atmosphere during the production of morpholine. The recovered hydrogen is now returned to the process, thus reducing the total hydrogen consumption by 40 per cent.

Because hydrogen is cheap to produce it is often not thought economic to recover and recycle the gas from waste gas streams. However, where hydrogen is delivered to a site from distant sources the transport costs can be substantial and may alone justify hydrogen extraction. This new application for hydrogen diffusion units in recovering and recycling may well be worthwhile for any chemical or pharmaceutical manufacturer who uses hydrogen as a process material.

In addition to economic considerations, on-site production of hydrogen can be logistically advantageous on isolated sites or when continuity of supply is paramount. At rates of 10 to 100 cubic metres per hour it can be generated efficiently from water and methanol followed by separation through silver-palladium membranes, see *Platinum Metals Rev.*, 1981, **25**, (1), 12–13.