

tubes positioned perpendicularly to the plane of the spirals, Figure 2(b), (10). Palladium-ruthenium tubes three metres long with an external diameter of 1.0 mm and an internal diameter of 0.8mm are commercially available in the U.S.S.R., and are resistant to pressure drops of up to 100 atm. A pilot plant incorporating such tubular reactors has been used for selective hydrogenation processes; this is shown in Figure 3.

Membrane catalysts with smaller amounts of palladium per unit of reactor volume may be produced by covering a hydrogen-permeable support with a film of palladium alloy which is several microns thick (11).

An Efficient and Environmentally Acceptable Production Route

Very pure chemicals and pharmaceuticals may be produced with the help of the membrane catalysts. The hydrogenation reactions of triple C≡C bonds into double C=C bonds, NO₂ groups into NH₂ groups and quinones into hydroquinones have been performed with better results than on the same catalyst but without hydrogen transfer through the membrane catalyst. Hydrogen-rich gases from refineries and ammonia synthesis plants may be used for hydrogenation instead of more expensive pure hydrogen. All of these factors are important in keeping the environment clean and in making best use of non-renewable hydrocar-

bon resources. Additionally, reaction coupling on the membrane catalysts also reduces the energy consumption.

References

- 1 V. M. Gryaznov, *Dokl. Akad. Nauk SSSR*, 1969, **189**, 794
- 2 V. M. Gryaznov, *Kinet. Katal.*, 1971, **12**, 640
- 3 V. M. Gryaznov, A. N. Karavanov, T. M. Belosljudova, A. M. Ermolaev, A. P. Maganjuk and I. K. Sarycheva, *U.S. Patent* 4,388,479; 1983
- 4 V. M. Gryaznov, V. S. Smirnov, L. K. Ivanova and A. P. Mischenko, *Dokl. Akad. Nauk SSSR*, 1971, **190**, 144
- 5 V. M. Gryaznov, V. S. Smirnov and M. G. Slin'ko, *Proc. Fifth International Congress on Catalysis*, North-Holland Publishing Company, Amsterdam and London, 1973, Vol. 2, p. 1139
- 6 V. M. Gryaznov, V. S. Smirnov and M. G. Slin'ko, *Proc. Sixth International Congress on Catalysis*, The Chemical Society, London, 1976, Vol. 2, p. 894
- 7 V. M. Gryaznov, V. S. Smirnov and M. G. Slin'ko, *Proc. Seventh International Congress on Catalysis*, Kodansha Ltd., Tokyo, 1981, Vol. 2, p. 224
- 8 V. M. Gryaznov, V. S. Smirnov, A. P. Mischenko and S. I. Aladyshev, *British Patent* 1,342,869; 1974
- 9 V. M. Gryaznov, V. S. Smirnov, A. P. Mischenko and S. I. Aladyshev, *U.S. Patent* 3,849,076; 1974
- 10 N. D. Fomin, V. M. Gryaznov, A. P. Mischenko, A. P. Maganjuk, V. N. Kulakov, V. P. Polyakova, N. R. Roschan and E. M. Savickij, *British Patent* 2,056,043A; 1981
- 11 V. M. Gryaznov, V. S. Smirnov, V. M. Vdovin, M. M. Ermilova, L. D. Gogua, N. A. Pritula and I. A. Litvinov, *British Patent* 1,528,710; 1978

A Further Compendium on Organometallic Compounds

Dictionary of Organometallic Compounds, First Supplement

EDITED BY DR. JANE E. MACINTYRE, Chapman and Hall, London, 1985, 564 pages, £135

The original three-volume Dictionary of Organometallic Compounds was reviewed in this journal in July last year (*Platinum Metals Rev.*, 1985, **29**, (3), 130). This outstanding work of reference has now been followed by the first supplementary volume, bringing the survey of the literature down to mid-1984 with many additional entries, some 2300 in all, and including a list of recent books and review articles, while some of the original entries in the main work have been revised and updated.

Compounds of the platinum metals listed

with their molecular formulae, CAS registry number, brief description and literature reference total 450, platinum being represented by 118 entries, rhodium by 90, ruthenium 83, iridium 74, palladium 48 and osmium 37.

The editor has had the co-operation of a distinguished international advisory board as well as a group of specialist editors for individual metals. This addition to the main dictionary makes a most useful compendium for all those engaged in any way in organometallic chemistry.

L.B.H.