plete hearing aid are shown on page 87. By using these magnets it was possible to reduce considerably the size and weight of both microphone and earpiece, the microphone measuring only 0.5 inch long by 0.45 inch maximum width by 0.296 inch in thickness. The earpiece measures only 0.43 by 0.43 by 0.59 inches. Both of these units have an excellent frequency response.

For some time now electric wrist watches incorporating cobalt-platinum alloy permanent magnets have been available in the United States. Just recently the first electric watch of Swiss manufacture has appeared, the movement having been developed by Ebauches S.A. of Neuchatel and the watch produced by the Avia concern, Degoumois & Co S.A. In this movement a horseshoe-shaped magnet is used, blanked from Platinax II sheet and pulse-magnetised so that the poles are at the ends of the two limbs of the horseshoe.

References

1 W. Jellinghaus .. .. *Z. tech. Physik.*, 1936, **17**, 33
2 J. B. Newkirk, A. H. Geisler, D. L. Martin and R. Smoluckowski *J. Metals*, 1950, **188**, 1249
3 J. B. Newkirk, R. Smoluckowski, A. H. Geisler and D. L. Martin *J. Appl. Physics*, 1951, **22**, 290
4 D. L. Martin and A. H. Geisler .. United States Patent 2,622,052, 1952; British Patent 697,595, 1953
5 D. L. Martin and A. H. Geisler .. *J. Appl. Physics*, 1953, **24**, 498
6 J. C. Chaston .. .. British Patent 849,505, 1960
7 L. A. Ford and K. Wright .. .. Johnson Matthey Research Laboratories, private communication

Ruthenium Complexes in Homogeneous Catalysis

HYDROGENATION OF OLEFINIC COMPOUNDS

Catalysed chemical reactions have grown enormously in importance during the past few decades, notably in the petroleum, petrochemical, heavy, fine and pharmaceutical chemical industries. At the present time almost all such reactions are heterogeneous gas or liquid phase processes in which the platinum group of metals play a well-known role as highly active and selective oxidation and hydrogenation catalysts, usually dispersed on a carrier or support. Interest has however focused during recent years on a number of homogeneous liquid phase catalysed reactions.

In such reactions, numerous workers are investigating whether the known catalytic properties of the platinum metals, together with their ability to form a very large range of complex co-ordination compounds, may lead to their future use on a large scale in this field. Among such investigations, it has recently been reported by J. Halpern, J. F. Harrod and B. R. James of the University of British Columbia (*J. Amer. Chem. Soc.*, 1961, **83**, (3), 753) that homogeneous hydrogenation of the olefin double bonds of maleic, fumaric and acrylic acids has been effected using chloro-ruthenate (II) complexes as catalysts. Experiments conducted with maleic acid in HCl solutions and with Ru(II) generated by reduction of $(NH_4)_2RuCl_6$ with $TiCl_3$, showed that hydrogenation proceeds at a conveniently measurable rate in the temperature range 70 to 90°C.

Homogeneous hydrogenation of olefinic double bonds necessitates activation in solution of both the olefinic compound and of the dissolved hydrogen by the catalyst. The latter should not itself be reduced in the process to a lower and possibly inactive valency state. Such catalyst-reduction has been responsible for the failure experienced by earlier workers when using Cu(II), Ag(I) and Hg(II) in the attempted hydrogenation of olefins. It is believed that hydrogenation using Ru(II) proceeds via the formation of a 1:1 Ru(II)-olefin complex which is capable of activating hydrogen and reacting with it to form a saturated compound with the liberation of Ru(II).

Although ethylene and propylene have also been found to form 1:1 complexes with Ru(II), homogeneous hydrogenation has not so far been observed under the conditions studied. It seems possible, however, that ruthenium complexes may find applications in this field.