# Johnson Matthey Metals Loans Scheme

## A CONTINUING COMMITMENT TO INNOVATION

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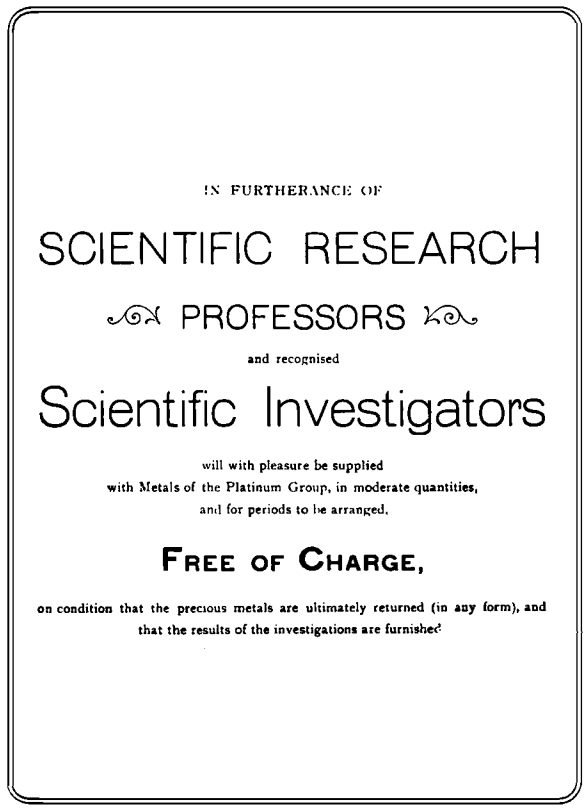
Towards the end of the eighteenth century the Spanish authorities were providing European chemists and institutions with substantial amounts of platinum, without charge, in order that its properties could be investigated and applications identified. When the metal became commercially available, Johnson Matthey was one of the leading supply houses that made similar arrangements with eminent scientists. The page reproduced here is from a Johnson Matthey catalogue in use in the early years of this century. Later the final word "furnished" was altered to "published", and the offer has continued to be a feature of the Company's commitment to progress in platinum metals technology.

In more recent years the Loans Scheme has grown on a worldwide basis, especially in the United Kingdom, but the principles have remained the same; metals and metal compounds are supplied to university staff working in areas likely to lead to innovative science, and the valuable residues are returned to Johnson Matthey in due course. The relationship developed through the loan of the metal can then lead to new work supported under the Science and Engineering Research Council's (SERC) CASE award system or to fully funded projects supported by Johnson Matthey.

It is interesting to recall that the Company has derived a number of its commercial successes of the past few years from discoveries stimulated by the Loans Scheme.

The successful Johnson Matthey–Davy McKee–Union Carbide hydroformylation (Low Pressure Oxo) process based on a homogeneous rhodium catalyst system derived from the observation at Imperial College, London, by Professor Sir Geoffrey Wilkinson using Loan Scheme rhodium, that rhodium catalysts have considerably increased activity compared with cobalt, and led to the achievement of an efficient processing technology, for the conversion of propylene to butyraldehydes. The process is characterised by more efficient use of feedstock, higher normal : iso product yield (>10 : 1 compared to 3–4 : 1 for cobalt


IN FURTHERANCE OF

SCIENTIFIC RESEARCH

PROFESSORS

and recognised

Scientific Investigators

will with pleasure be supplied
with Metals of the Platinum Group, in moderate quantities,
and for periods to be arranged,

FREE OF CHARGE,

on condition that the precious metals are ultimately returned (in any form), and that the results of the investigations are furnished

catalysts), lower pressure operation and long catalyst life (>1 year).

Following the discovery in the late 1960s of the anti-tumour properties of certain platinum ammine and amine complexes by Professor Rosenberg at Michigan State University, the development of the first platinum based cancer drug, Cisplatin, was considerably aided by metal loans. The search for second generation drugs both in the United States of America and the U.K. also received support from platinum loans. This particularly applied to a group of U.K. academics whose work was co-ordinated and funded by Johnson Matthey and Rustenberg Platinum Mines. Synthetic studies and biological screening unearthed a large number of active platinum compounds, while structure/activity and structure/toxicity relationships were established. Pharmacology, toxicity and clinical studies have led to the recent successful commercialisation of Carboplatin (Paraplatin™) some sixteen years later.

The development of car exhaust catalysts, another very important area for Johnson Matthey, was greatly assisted by university studies and loans, initially in support of fundamental research on alloy catalysts and later in the characterisation of catalyst systems for this application. For example, studies at Nottingham University increased the understanding of the mode of interaction between nitric oxide and rhodium supported on alumina (1). This led to an understanding of the mode of operation of rhodium/platinum "three-way" catalyst systems which were able to remove simultaneously hydrocarbons, carbon monoxide and nitrogen oxides.

Research work at Liverpool University on the addition of platinum to nickel based alloys has been supported by Johnson Matthey via a collaborative SERC CASE award and the Loans Scheme. The addition of platinum to nickel based alloys can have a profound effect on their oxidation and hot corrosion resistance. Improvements in gas turbine blade performance in aggressive environments are linked with the protective nature of surface oxides and coatings. The precise role of platinum in promoting and maintaining this protection is still under active investigation, and this work was reported here earlier this year (2).

Johnson Matthey has similarly supported research work on the rhodium-platinum catalyst gauzes used for ammonia oxidation. Using Field Ion Microscope and Scanning Electron Microscope techniques the nucleation and growth of large cage-like features which develop on the gauze surfaces have been investigated and a new insight into the mechanism of this very well established commercial reaction has now been gained (3, 4) with benefit to the users in terms of catalyst life and noble metal inventory.

The Loans Scheme and Johnson Matthey support of innovative research continues to operate on a worldwide basis in order to encourage work in any technological area that could benefit from the generation of new ideas for the use of the platinum group metals and their compounds, and to increase awareness of their properties. For these reasons, Johnson Matthey welcomes proposals from academics with innovative approaches to platinum metals technology; these will be considered for support.

### References


1 E. A. Hyde, R. Rudham and C. H. Rochester, *J. Chem. Soc., Faraday Trans. I*, 1983, **79**, (10), 2405; 1984, **80**, (3), 531

2 G. J. Tatlock, T. J. Hurd and J. S. Punni, *Platinum Metals Rev.*, 1987, **31**, (1), 26

3 A. R. McCabe and G. D. W. Smith, *Platinum Metals Rev.*, 1983, **27**, (1), 19

4 A. R. McCabe, G. D. W. Smith and A. S. Pratt, *Platinum Metals Rev.*, 1986, **30**, (2), 54


## Platinum Ternary Alloys

Please note that the following alterations should be made to the data given in "Some Ternary and Higher Order Platinum Group Metal Alloys", which appeared in *Platinum Metals Rev.*, 1987, **31**, (2), 74–90.

On page 83, in Figure 12 the temperature given as 1200°C should be 1250°C; also Figures 12 and 13 should be transposed, but not the related captions. On page 85, within Figure 16, Pt-55Pd-55Rh should read Pt-55Pd-15Rh.

Any confusion caused is greatly regretted.