

References

- 1 U. Zwicker, *Metalloberfläche*, 1960, **14**, (11), 334
- 2 N. D. Tomashov, *J. Electrochem. Soc.*, 1961, **108**, (21), 113
- 3 R. M. Duncan and B. H. Hanson, "The Selection and Use of Titanium", ed. D. A. Ashby, Oxford University Press, Engineering Design Council, BSI & CEI, 1980
- 4 S. Fujishiro, D. Eylon and D. W. Gehring, *Thin Solid Films*, 1979, **63**, 55
- 5 S. Fujishiro and D. Eylon; "Titanium '80, Science & Technology", ed. H. Kimura and O. Izumi, Met. Soc. AIME, U.S.A., 1980, p. 1175
- 6 "Physical Chemistry of Ruthenium and its Alloys", Moscow University Press, 1979, p. 100
- 7 A. T. Churchman, *Proc. Roy. Soc.*, 1984, **216A**, 193
- 8 R. J. Van Thyne and H. D. Kessler, *Trans. AIME.*, 1954, 193
- 9 J. C. Williams, Proc. Conf. "Titanium, Science and Technology", ed. R. I. Jaffee and H. M. Burte, Plenum, U.S.A., 1973, p. 1433
- 10 A. Khataee, H. M. Flower and D. R. F. West, *Mater. Sci. & Tech.*, in press
- 11 J. L. Murray, *Met. Trans.*, 1988, **19A**, 243
- 12 J. L. Murray, *Bull. Alloy Phase Diag.*, 1982, **3**, (2), 216
- 13 F. A. Shunk, "Constitution of Binary Alloys", 2nd Suppl., McGraw-Hill, U.S.A., 1969, p. 40
- 14 K. S. Jepson, A. R. Brown and J. A. Gray, Proc. Conf. "The Science, Technology and Application of Titanium", ed. R. I. Jaffee and N. E. Promisel, Pergamon, U.K., 1970, p. 677
- 15 A. D. Dwight, "Intermetallic Compounds", ed. J. H. Westbrook, J. Wiley & Sons, U.S.A., 1967, p. 176

Platinum 1989

The latest annual survey of commercial aspects of the six platinum group metals was published by Johnson Matthey during May. Compiled with the assistance of many people in the platinum-producing and platinum-using industries throughout the world, "Platinum 1989" first summarises the events that affected the supply, demand and use of platinum and palladium, and to a lesser extent rhodium, iridium, osmium and ruthenium during 1988, before going on to consider the outlook for 1989, and the years beyond.

For the second successive year supplies of primary platinum exceeded three million ounces troy, but demand was again greater than this and the deficit had to be met by metal withdrawn from stocks. Interestingly, Japanese imports jumped by no less than thirty per cent, compared with the record amount purchased in the previous year, to 67.5 tonnes, this being equivalent to 68 per cent of the primary supplies available to the Western World. The Japanese investment and jewellery markets were both of major importance during 1988, the latter absorbing just over one million ounces troy. A most interesting eight page section of the survey is devoted to the use of platinum in jewellery, a topic generally not considered in *Platinum Metals Review*; this includes a brief outline of the main technical features

of the metal that ensure its position in the highest-value sector of the market.

The perceived future demand for platinum metals in the European autocatalyst market was also highlighted. The European Commission has now reacted to growing concern about air quality, and the damage caused by emissions from motor vehicle engines. Thus the usage of the metals is expected to rise steadily over the next three years, as emission control catalytic converters become standard equipment on cars in Western Europe. Autocatalyst manufacture is already the largest application for platinum, taking 1.325 million ounces troy in 1988, and although the metal being recovered from scrapped converters is increasing, it amounted to only 160,000 ounces troy during the year under review.

Another notable feature of the past year was again the record demand for palladium resulting from increased use in both electronics and dental applications.

Readers of *Platinum Metals Review* who do not have ready access to "Platinum 1989", and who believe they would benefit from receipt of this comprehensive survey of the commercial aspects of the platinum metals should send their requests for a copy to the editor: Mr F. John Smith, Johnson Matthey P.L.C., New Garden House, 78 Hatton Garden, London EC1N 8JP.