

Other Platinum Group Metals

Rhodium

Demand for rhodium is predicted to fall by 31 per cent to 557,000 oz in 2001. Last year, car companies in the USA and Japan made significant additions to strategic stocks; in contrast, stock levels are thought to have fallen this year, thus reducing fresh demand from the auto sector. Other demand will rise slightly, due to higher sales of rhodium catalysts to the chemical industry.

Autocatalyst

Sales of rhodium to auto makers are expected to fall by 31 per cent to 548,000 oz in 2001. This decline is a result of changes in stock levels during 2000 and 2001; underlying consumption in catalysts continues to rise, due to tightening legislation and the use of extra rhodium as a means of thrifting palladium.

Sales to European car companies will be up slightly this year. Average rhodium loadings on gasoline vehicles have increased, following the application of Stage III emissions legislation to all new vehicles from January 2001. This trend will outweigh a decline in production of gasoline cars, due to a shift in consumer preferences in favour of diesels (on which platinum-only catalysts are used).

In Japan, stricter emissions standards were applied to new models from October 2000, and will apply to all new vehicles from September 2002. Most auto makers are already meeting the new regulations across their vehicle ranges, and some are voluntarily meeting tighter limits: consequently, rhodium loadings are up on last year. However, actual sales to the Japanese auto industry are

expected to fall; following a build up in inventories last year, we believe that there has been a reduction in stock levels in 2001.

US auto companies are also thought to be drawing upon stocks of rhodium purchased in 2000, and as a result demand will be significantly lower this year. North America is the only region in which actual use of rhodium on catalysts will fall: vehicle production declined 13 per cent in the first eight months of this year, and this has affected total consumption, despite a small increase in average loadings.

In the Rest of the World region, sales to auto makers will be boosted by the introduction of Korean LEV regulations,

which have been in force since January 2001. This has led to significant increases in loadings of all the autocatalyst pgm.

The outlook for consumption of rhodium in autocatalysts is positive. Higher loadings will be required in all regions in order to meet tightening emissions standards. In addition, some auto makers are planning to use additional rhodium in order to permit greater thrifting of palladium.

Other Demand

Demand for rhodium in other applications is expected to rise by 6 per cent to 101,000 oz in 2001. In the chemical sector, there have been increased sales of rhodium catalysts for new oxo alcohol plants being constructed in South Africa and the Far East. The use of rhodium in glass manufacture will be little changed, with continued strong demand from LCD and fibreglass producers.

Ruthenium & Iridium

Demand for ruthenium is forecast to decline by 7 per cent to 409,000 oz in 2001, mainly due to a sharp drop in consumption in electronic components. Use of iridium will be stable, with lower sales to the chemical industry balanced by strong demand from the electronics industry, which uses iridium crucibles for crystal growing.

Consumption of ruthenium in the electronics sector will decline by 14 per cent to 204,000 oz in 2001, reflecting a worldwide downturn in the electronics industry. Ruthenium's principal use is in resistor chips, demand for which has

Rhodium Supply and Demand '000 oz		
	2000	2001
Supply		
South Africa	457	441
Russia	290	100
North America	16	22
Others	3	4
Total Supply	766	567
Demand		
Autocatalyst: gross	793	548
recovery	(79)	(92)
Chemical	35	43
Electrical	7	6
Glass	42	41
Other	11	11
Total Demand	809	557
Movements in Stocks	(43)	10



Ruthenium Demand by Application '000 oz

	2000	2001
Chemical	79	62
Electrochemical	97	84
Electronics	238	204
Other	28	59
Total Demand	442	409



fallen in line with lower production of devices such as personal computers and mobile phones. Usage of ruthenium has also been affected by a continuing trend towards miniaturisation. However, the decline in demand in resistor chips has been partly offset by increased use of ruthenium resistor pastes in hybrid integrated circuits.

The use of iridium in the electronics industry is mainly in the form of crucibles, used to grow crystals for a variety of end uses. In 2001, there has been an increase in demand for crucibles from manufacturers of yttrium aluminium garnet crystals, used in lasers for medical and industrial products.

However, sales of crucibles used to grow lithium-based crystals for electronic devices have softened this year: the downturn in the mobile phone market means that crystal producers currently have sufficient capacity to meet demand from end users.

In the electrochemical sector, sales of ruthenium are forecast to decline by 13 per cent to 84,000 oz this year, while iridium demand is expected to be unchanged at 19,000 oz. Both metals are incorporated into coatings for electrodes used in a number of electrochemical processes, the principal one being the production of chlorine and caustic soda. The downturn in demand for ruthenium is a result of some manufacturers drawing upon inventories of metal built up in earlier years.

Another significant user of ruthenium is the chemical industry. In recent years large quantities of metal have been purchased for a catalyst used in the manufacture of ammonia. We do not expect any purchases of ruthenium for new ammonia plants this year and, as a result, total demand from the chemical sector will be lower than in 2000. However, a number of other proprietary speciality and bulk chemical processes

Iridium Demand by Application '000 oz

	2000	2001
Chemical	16	9
Electrochemical	19	19
Electronics	38	45
Other	29	27
Total Demand	102	100



will continue to consume substantial amounts of ruthenium. Chemical demand for iridium is also expected to decline this year, due to lower purchases of an iridium-ruthenium catalyst for acetic acid production.

Demand for ruthenium in other applications is forecast to rise sharply this year, reflecting the rising use of ruthenium in titanium pipes for the oil and gas industry. The addition of ruthenium to the titanium alloy gives improved corrosion resistance, and as a result this material is increasingly being adopted in harsh environments, such as those encountered in geothermal and offshore drilling projects.

Supplies

Rhodium

Supplies of rhodium are forecast to fall by 26 per cent to 567,000 oz this year. After record shipments of rhodium in 2000, much of it from government controlled stocks, Russian exports have returned to more normal levels this year. Sales by Almaz are expected to total around 100,000 oz.

Supplies of rhodium from South Africa were also augmented by sales from stocks last year, but shipments in 2001 will be similar to production. As a result, South African supplies will fall this year, despite an increase in underlying output.

Further substantial increases in rhodium output are in the pipeline. Most of the recently announced expansions of platinum mining in South Africa will exploit the UG2 reef, which typically contains about twice as much rhodium as Merensky Reef. If all

these expansions proceed, by the middle of the decade UG2 will account for nearly 60 per cent of all ore milled by South African platinum producers – up from around 45 per cent in 2001.

Ruthenium & Iridium

Ruthenium prices have fallen sharply since the beginning of 2001, reflecting an increase in availability following last year's shortages of metal. Mine output has risen, in line with higher output from the ruthenium-rich UG2 reef. We also believe that some of the metal purchased by investors in 2000 has been sold, adding to liquidity in the market.

With demand for iridium at around 100,000 oz, supplies of this metal are ample to meet consumer requirements.