

Other Platinum Group Metals

Rhodium

Demand for rhodium in 2002 is expected to be marginally reduced compared to 2001 at 568,000 oz. Autocatalyst demand continues to grow, supported by increased light vehicle production in the USA and Japan over the first nine months of the year. Several auto companies, however, are believed to have further reduced rhodium inventories that were heavily augmented in 2000. Rhodium usage in chemical process catalysts and glassmaking equipment has weakened slightly.

Autocatalyst

Net demand for rhodium by auto makers is forecast to increase by 1.2 per cent to 574,000 oz in 2002. Automobile emission legislation continues to tighten worldwide and rhodium is an indispensable component of gasoline vehicle autocatalysts for the control of NOx. In addition, programmes to thrift palladium that were initiated in 2000 and 2001 are taking effect and have raised rhodium loadings in some instances.

The increase in metal purchases by the auto sector this year has not been as great as it might have been due to some US-based auto makers reducing their inventories. Meanwhile, recovery of rhodium from spent autocatalysts continues to rise and will reach almost 100,000 oz this year.

In North America, rhodium sales to auto companies will fall by over 20 per cent despite rising vehicle production. Although actual use of rhodium in autocatalysts will continue to increase, the drive by US auto makers to reduce costs has led to a significant draw down of pgm stocks,

including rhodium. This will outweigh rising US production of cars and light trucks, which is forecast to grow by up to 9 per cent in 2002.

Japanese demand for rhodium in autocatalysts is expected to increase substantially this year. This is due in part to rising production and exports – Japanese output of passenger cars rose 3.6 per cent between January and August 2002, driven by a 15 per cent increase in exports to North America. Growing rhodium demand in Japan is also a function of auto manufacturers producing vehicles to tighter emission standards than are required by present legislation. Loadings of pgm have generally been increased on new models to achieve greater emission reductions as this is a strong sales incentive.

Rhodium sales in Europe this year are expected to rise moderately compared to 2001. Passenger car sales in most countries across the region have been weak (with the exception of the UK) and light vehicle production for the year is forecast to drop by around 2 per cent. However, sales of premium and performance cars have held up much better than other sectors – these cars typically require a greater number of catalysts, with higher than average precious metal loadings.

In the Rest of the World, rhodium demand in 2002 should increase significantly in percentage terms, although the volumes involved are still relatively small. Chinese light vehicle production continues to expand at a rapid rate and emission legislation is gradually following the European Union model. Falling car production in South America, due to the economic problems in Brazil and Argentina, will be more than compensated for by growing output in India, Malaysia and South Korea.

The outlook for rhodium consumption in autocatalysts continues to be positive, although in the short-term much will depend on whether the current level of cars sales in the USA can be maintained in 2003. In the longer term, demand will continue to benefit from tightening emission legislation in all major regions, including the US Tier II regulations that will be phased in from 2004 onwards.

Other Demand

Demand for rhodium in chemical applications is expected to fall by 9 per cent to 40,000 oz in 2002. Many sectors of the European chemical industry have experienced a difficult year and reduced demand for rhodium-based process

Rhodium Supply and Demand		
'000 oz		
	2001	2002
Supply		
South Africa	452	483
Russia	125	65
North America	23	26
Others	4	7
Total Supply	604	581
Demand		
Autocatalyst: gross	567	574
recovery	(89)	(99)
Chemical	44	40
Electrical	6	6
Glass	39	37
Other	10	10
Total Demand	577	568
Movements in Stocks	27	13



Ruthenium Demand by Application '000 oz

	2001	2002
Chemical	61	102
Electrochemical	92	100
Electronics	136	163
Other	62	64
Total Demand	351	429



catalysts will account for most of the overall decline. Rhodium consumption in glass applications, thermocouples, and other uses is expected to be broadly in line with 2001 levels.

Ruthenium & Iridium

Ruthenium demand in 2002 is forecast to rebound by more than 22 per cent from the slump of 2001 to reach 429,000 oz. The recovery is due to excess inventories largely having been eliminated from the electronics industry, and to growing demand for ruthenium-based catalysts. Iridium demand, however, is expected to fall to 84,000 oz as the oversupply of iridium crucibles persists in the electronics market.

Consumption of ruthenium in electronic components is expected to stage a recovery in 2002 following the slump in orders in 2001. Although consumer demand for electronics remains weak, the large component inventories present at the start of 2001 have been reduced to more normal working levels. Production of ruthenium-based products such as resistors has therefore increased. With few component manufacturers holding significant inventories of ruthenium pastes, demand for the metal should grow to 163,000 oz in 2002.

This year's total includes a small contribution from a new application for ruthenium in computer hard disks. This is expected to be consuming significant volumes of metal within the next three to four years as leading manufacturers adopt the new technology.

Iridium's primary application in electronics is in the form of crucibles used to grow high-purity crystals. Significant overcapacity has persisted in this sector following very strong sales in 2000. Component demand has been hit by a steep decline in sales in the mobile telecommunications industry, and total iridium demand in electronics is forecast to drop to 22,000 oz in 2002.

Both ruthenium and iridium are used to coat electrodes used in the chloralkali process, which involves the electrolysis of

Iridium Demand by Application '000 oz

	2001	2002
Automotive	10	6
Electrochemical	22	23
Electronics	27	22
Other	31	33
Total Demand	90	84



brine to chlorine and caustic soda. The chloralkali industry has been relatively stable during 2002, and this will be reflected in steady demand for iridium and ruthenium this year.

The chemicals industry consumes significant volumes of ruthenium in process catalysts used in the manufacture of acetic acid, ammonia and speciality chemicals. Demand is set to increase to 102,000 oz this year as additions are made to manufacturing capacity for several products. In addition, the Cativa[®] process for the production of acetic acid, which uses an iridium-ruthenium catalyst, is becoming more widely used.

In other sectors, orders for corrosion resistant titanium-ruthenium pipe from the oil and mining industries have remained firm but autocatalysts containing iridium have now largely been replaced by platinum-based formulations.

Supplies

Rhodium

Total rhodium supplies in 2002 are forecast to change little from 2001, falling moderately to 581,000 oz. The balance of supply will move increasingly in favour of South Africa, where output is increasing in line with growing platinum production. The majority of expansions and new projects in South Africa are exploiting UG2 ore, which has a higher rhodium content than the Merensky Reef.

Russian sales are forecast to continue to slip back from the exceptional total in 2000, when large volumes were sold from state inventories to western auto manufacturers. Several of them are understood to have satisfied a proportion of their requirements this

year by reducing their inventories and total demand has been comfortably covered by supply.

Ruthenium & Iridium

The price of iridium fell by 44 per cent and that of ruthenium by 25 per cent during the first nine months of 2002. This was in part a reflection of greater availability of metal from South Africa – UG2 ore contains higher concentrations of ruthenium and iridium compared to the Merensky Reef. For both metals supply is more than sufficient to meet demand.