

# OTHER PLATINUM GROUP METALS

- Gross demand for rhodium increased by 22% last year to 873,000 oz. Supplies of rhodium declined slightly to 751,000 oz. Overall, the rhodium market tightened but remained in surplus by 114,000 oz.
- Recycling of rhodium rose by 26% to 236,000 oz in 2010.
- Net demand for ruthenium was 79% higher in 2010 at 1.03 million ounces.
- Net iridium demand strengthened from 81,000 oz in 2009 to 334,000 oz last year. The iridium market, like that of ruthenium, remained adequately supplied.

## RHODIUM

The rhodium market tightened in 2010, although it remained in surplus by 114,000 oz. Global supplies of rhodium declined by 19,000 oz to 751,000 oz, mainly due to a build-up of pipeline stocks in South Africa. Gross demand for rhodium increased by 22% to 873,000 oz, led by a strong recovery in purchasing of rhodium by the automotive industry and an impressive performance by the glass and chemical sectors. Recycling of rhodium from spent autocatalysts totalled 236,000 oz last year, a rise of 26% compared with 2009.

### Autocatalyst Demand

Gross purchasing of rhodium for use in autocatalysts strengthened by 105,000 oz to reach 724,000 oz in 2010 as vehicle production worldwide picked up compared with the depressed level of 2009.

Higher consumer and business confidence in many countries as the world economy recovered from recession drove production of vehicles, boosting rhodium purchases. The largest share of demand came from the light duty gasoline sector, where rhodium is used together with palladium, and to a lesser extent platinum, in three-way catalyst (TWC) formulations. However, continued thrifting of rhodium in autocatalysts, a knock-on effect from previous high prices, meant that automotive rhodium demand remained below the level of 2008 despite higher levels of vehicle production.

Gross demand for rhodium in autocatalysts was highest in Japan in 2010, with 204,000 oz of rhodium purchased for use in the light duty vehicle sector, compared with 164,000 oz in 2009. There was a strong increase in production for both the domestic and export markets as the world economy fared better than in 2009. North America accounted for 152,000 oz of demand for rhodium. This was mainly for gasoline vehicles, but there was also some demand in light duty diesel vehicles such as pick-up trucks and SUVs as production of these recovered in line with total automotive production.

Purchasing of rhodium for use in the Chinese autocatalyst sector increased to 141,000 oz in 2010. With strong sales of domestically-produced gasoline vehicles, rhodium demand continued to grow despite efforts to reduce rhodium content on cost grounds. Rhodium thrifting was most evident in the European market, where gross rhodium demand dropped slightly to 106,000 oz despite higher vehicle production than in the previous year. This was due to automakers using the enforcement of Euro 5 emissions standards, beginning in late 2009 for new models, as an opportunity to reduce rhodium content in gasoline autocatalyst formulations.

### Other Demand

Demand for rhodium in other applications increased in 2010 in line with economic recovery, which lifted industrial purchasing. This was most marked in the glass sector, where purchases of rhodium rose by 200% to 57,000 oz. There was strong demand from the TFT-LCD and glass fibre manufacturing sectors as construction of new and replacement capacity took place. The large year-on-year rise, however, was partly a function of depressed demand in 2009 when closure of old facilities returned large amounts of rhodium to the market.

The chemical sector saw a substantial rise in rhodium demand, to 68,000 oz. Higher rates of capacity utilisation in chemical plants, as well as the construction of new oxo-alcohol manufacturing plants in Asia, helped lift demand.

Rhodium Demand by Application '000 oz			
	2008	2009	2010
Autocatalyst	768	619	724
Chemical	68	54	68
Electrical	3	3	4
Glass	34	19	57
Other	24	21	20
<b>Total Gross Demand</b>	<b>897</b>	<b>716</b>	<b>873</b>
<b>Autocatalyst Recycling</b>	<b>(227)</b>	<b>(187)</b>	<b>(236)</b>
<b>Total Net Demand</b>	<b>670</b>	<b>529</b>	<b>637</b>

## Supplies

Supplies of rhodium fell by 19,000 oz in 2010 to 751,000 oz. Despite higher mine output in South Africa in late 2010, a build-up of pipeline metal stocks resulted in supplies falling by 3% to 642,000 in 2010. Production of rhodium in North America declined slightly but Zimbabwean rhodium output grew by 5,000 oz to 24,000 oz.

## RUTHENIUM & IRIIDIUM

**2010 saw a large increase in demand for both ruthenium and iridium due to technology changes, stock building in certain sectors and better economic conditions. Total ruthenium demand strengthened by 79% to 1.03 million ounces on the back of strong purchasing by the electrical and electrochemical sectors. Iridium demand increased more than fourfold during 2010, reaching 334,000 oz as purchases of iridium crucibles attained record levels.**

## Demand

The electrical sector remained the biggest demand area for **ruthenium**, and also the fastest-growing, in 2010. Electrical demand for ruthenium increased by 418,000 oz to 754,000 oz, mainly driven by purchasing from the hard disk drive sector, where it is used together with platinum in now-ubiquitous perpendicular magnetic recording (PMR) hard disk drives. Improved economic conditions led to a surge in sales of computer equipment to consumers and businesses. This in turn drove target and disk drive producers to raise production levels and build pipeline stocks of ruthenium. The hard disk drive sector in the first half of 2010 was therefore in one of its periodic upswings, where new demand for ruthenium greatly exceeded the amount of metal being recovered from the refining of old sputtering targets and associated scrap. The second half was a different story as full stock levels and higher prices, which had been driven by strong purchasing in the first half, led to a softening of demand. The second half of 2010 was therefore similar to the year 2009 when overall demand was limited by full stock levels and returns from recycling.

Ruthenium demand from the electrochemical sector rose by 39% in 2010 to 132,000 oz, mainly as a result of replacement of mercury-based chlor-alkali plants in China with higher-loading membrane cells, driven by environmental policies. New capacity for the production of chlorine and sodium hydroxide in this way added significant new demand in 2010. Ruthenium

### Ruthenium Demand by Application

	'000 oz		
	2008	2009	2010
Chemical	139	89	100
Electrical	410	336	754
Electrochemical	95	95	132
Other	55	54	43
<b>Total Demand</b>	<b>699</b>	<b>574</b>	<b>1,029</b>

purchasing in the chemical sector also grew as plants were run at higher capacity to satisfy downstream demand, stimulating replacement of ruthenium catalysts and promoters.

**Iridium** demand increased more than fourfold, adding an extra 253,000 oz to reach 334,000 oz in 2010. Much of this came from the sudden and rapid expansion of demand for iridium crucibles by the electrical sector. The recent rise in purchasing of backlit LED televisions stimulated demand for single crystal sapphire, which is used as a substrate in LEDs. The use of iridium crucibles is amongst the various methods used to make sapphire crystal, therefore 2010 saw a surge in demand for iridium in this application.

The refitting of the Chinese chlor-alkali industry also generated extra demand for iridium in the electrode coating of membrane electrolytic cells. In addition, growth in the worldwide automotive sector last year led to higher demand for iridium in spark plugs.

## Supplies

Ruthenium demand exceeded supplies from mined output in 2010, however the shortfall was met from movement of above-ground stocks and some release of speculative holdings. Strong demand from the hard disk sector in the first half of the year helped drive up the average annual price by 107%, although the price remained well below the level seen in 2007 when the first wave of stock building in the hard disk drive sector took place. Supplies of iridium expanded, largely drawing down refined stocks, to meet new demand in 2010.

### Iridium Demand by Application

	'000 oz		
	2008	2009	2010
Chemical	21	11	18
Electrical	15	7	194
Electrochemical	25	33	82
Other	41	30	40
<b>Total Demand</b>	<b>102</b>	<b>81</b>	<b>334</b>