reduction for palladium is similar to that for platinum recovered by palladium alloy catchment gauze (13).

Conclusions

In flowing oxygen atmospheres and in an ammonia oxidation environment used for nitric acid production at 800 to 950°C, the weight losses and the platinum losses from platinum-rhodium binary and platinum-palladium-rhodium ternary alloys and their catalyst gauzes obey Equations (i) and (ii):

$$\Delta W/s = K_1 t^{2/3} \text{ and } \Psi_\Sigma = K_2 t^{2/3}$$

and are controlled by the formation and volatilisation of PtO_2.

The different values for rate constants K_1 and K_2 are mainly due to the different effects of the palladium component on the formation rate of PtO_2. Adding palladium to platinum-rhodium alloys and increasing the palladium content in platinum-palladium-rhodium alloys clearly decrease platinum losses, and K_1 and K_2. This is due to palladium enrichment and the formation of palladium metal and a PdO vapour layer on and over the alloy surface, which is passive to platinum oxidation and can reduce PtO_2 to platinum, thus reducing the formation rate of PtO_2.

Results of industrial experiments for nitric acid production show that the rate of platinum loss from platinum-12 per cent palladium-3.5 per cent rhodium alloy gauzes is 0.044 gram platinum ton^{-1} nitric acid at atmospheric pressure and 0.121 gram platinum ton^{-1} nitric acid at medium pressure, the former being about 28 per cent lower (0.061 grams of platinum per ton of nitric acid) than for platinum-4 per cent palladium-3.5 per cent rhodium alloy gauzes, which in turn is about 21 per cent lower (0.15 to 0.153 grams of platinum per ton of nitric acid) than for platinum-5 per cent rhodium and platinum-10 per cent rhodium binary alloys.

The rate of ammonia consumption of platinum-12 per cent palladium-3.5 per cent rhodium alloy gauzes is about 3 to 7 per cent lower than for platinum-5 per cent rhodium and platinum-10 per cent rhodium binary alloys. The low rates of platinum loss and ammonia consumption of the platinum-12 per cent palladium-3.5 per cent rhodium ternary alloy mean that using the alloy can prolong the service life of the catalyst gauzes, save platinum metal and reduce the costs of nitric acid production.

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Ruthenium Photoactive Dendrimers

Dendrimers are highly defined macromolecules with large tree-like structures, which can be attached to simpler metal complexes, to make use of a physical property of the metal complex.

Scientists from universities in Italy and Germany have now synthesised photoactive dendrimers built around a luminescent $[Ru(bpy)_3)]^{2+}$ core (bpy = 2,2′-bipyridine), with 12 and 24 luminescent naphthyl units in the periphery (M. Plevoets, F. Vögtle, L. De Cola and V. Balzani, *New J. Chem.*, 1999, **23**, (1), 63–69).

The larger dendrimer core fluoresces three times more than the basic ruthenium complex, showing that very efficient energy transfer is taking place from the naphthyl units to the metal core (antenna effect). This has various applications, such as antenna systems for harvesting energy in sunlight.