This account has been confined to the reactions of platinum with oxygen. Similar considerations must apply to the oxidation of the other platinum metals, as well as of gold and silver, although there are, of course, differences in detail. Reliable figures for the heats of formation of the solid oxides of the platinum metals are not, in general, available, but it seems likely that they are higher than that of platinum. The films formed by solid oxides on palladium, rhodium and iridium, for instance, are thick enough to give tarnish colours at temperatures up to about 500°C, though they decompose or volatilise at higher temperatures. However, complications arise with palladium, silver, and probably rhodium and ruthenium, on account of the need for taking into account the solubility of oxygen in the solid metal. A detailed account of the reactions of the other noble metals is thus another story—as is the behaviour of alloys of the metals with each other and also the complications which follow the presence of certain impurities in the solid or the gas phases.

Finally, it is of interest to consider how these observations influence the concept of nobility as applied to the platinum metals. To the alchemist, silver and gold were noble because they resisted fire. (Not, it should be noted, because they were resistant to acids—silver is readily soluble in nitric acid.) In recent times, silver, gold and the platinum metals are widely classed as noble, but it has sometimes been difficult to reconcile the obvious affinity of osmium and ruthenium with oxygen with the concept of nobility. It would seem that these difficulties may be resolved if a noble metal is considered as one whose surface oxides sublime (with or without some prior partial decomposition) at a temperature below its melting point.

References

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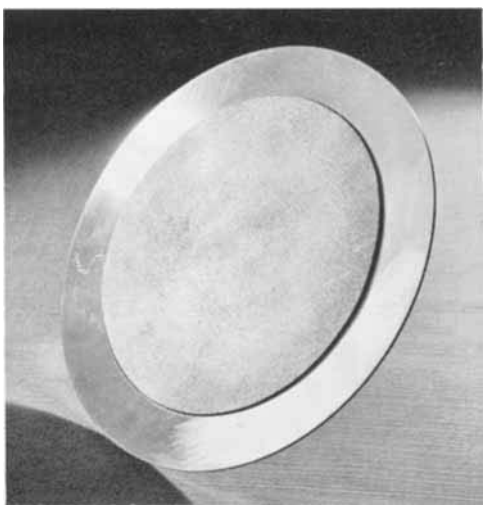
Sintered Platinum Filters

The problems of filtering highly corrosive liquids such as hydrofluoric acid, or of filtration at very high temperatures, have been simplified by the introduction by Johnson Matthey of a range of sintered platinum filter discs of controlled pore size.

Made by hydraulic pressing a carefully graded mixture of platinum powder held in an organic carrier and sintering at high temperature, the filter discs are mechanically strong and present no difficulty in handling. Six standard discs constitute the range available, the mean pore size being from 5 to 100 microns, with an accuracy of ± 15 per cent. The largest disc available at present is 5 inches in diameter and the minimum thickness is 0.065 inch. They can be mounted, as shown in the illustration, into a solid platinum rim to facilitate installation. Cleaning the filters is naturally a simple operation as they are free from corrosive attack by almost all mineral acids and there is no tendency to form oxide films on heating.



A platinum filter disc of 10 micron mean pore size, 5 inches in diameter, mounted in a solid platinum rim ready for installation in a filtration plant