parameters for osmium and iridium are those selected above, while values for the remaining four platinum group metals are those selected by Donohue (17), after correction to the new conversion factor (1).

Having reviewed crystallographic data for both osmium and iridium, selected values of their densities at a temperature of 20°C are 22,590 kg/m^3 and 22,560 kg/m^3, respectively, thus confirming that osmium is the densest metal.

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Materials for Electronic Applications

Important applications for the platinum metals occur in the electronics industry. Present and future applications for these metals, and their related technology, have been considered here previously (1) as has the production of palladium powders for these applications by chemical precipitation techniques (2). With a continuing requirement for ever improved materials, a recent research summary of precipitation methods that have evolved from an investigation of solvent extraction-based techniques for the refining of noble metals is therefore timely (3).

Palladium powders were readily recovered from aqueous solutions by hydrogen reduction and examination by scanning electron microscopy showed the precipitate to consist generally of spherical particles. Those produced from a 1.0M hydrochloric acid solution displayed spikes upon the surface, but if the solution was less acidic, the number of spiked particles was considerably reduced.

Precipitation of palladium by hydrogen reduction from loaded organic extractants was slower than from the corresponding aqueous chloride system, and the particle size was significantly smaller. The surface of the spheres was smooth, but particle agglomeration could result from entrapment of aqueous phase media.

Platinum powders were produced by the hydrogen reduction of hydrogen hexachloroplatinate-hydrochloric acid-sodium chloride solutions. Precipitation rates were significantly slower than for palladium. Most of the platinum precipitated out as a black powder with a smooth, spherical appearance, the remainder forming platelets with a lustrous appearance. More uniform particles could be achieved by catalysing the reduction.

The morphology of the platinum particles could be changed by the addition of surface active molecules. Thus spheres could be eliminated, and flakes and platelets produced.

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