posed by mineral acid, whereas the platinum metal compounds are stable.

In the metallic state there are obvious analogies between palladium and silver, and between platinum and gold. The former pair of metals dissolve readily in nitric acid and in boiling concentrated sulphuric acid, and react superficially with iodine at room temperature. Platinum and gold resist all acids except aqua regia and are not oxidised on heating, or affected by iodine. Rhodium dissolves slowly in boiling concentrated sulphuric acid, in which respect it resembles palladium, but otherwise is unaffected, like iridium and ruthenium, by all acids or mixtures of acids. Osmium is slowly converted by boiling nitric acid or aqua regia into the volatile tetroxide except when in the massive form.

To sum up, it will be seen that in their physical and chemical properties, ruthenium and osmium more closely resemble technetium and rhenium, or in certain respects molybdenum and tungsten, than they do iron. Rhodium and iridium are more closely allied to cobalt than to any other metal, while palladium and platinum have close analogies both with nickel and with the precious metals of Group I.

References

1	C. E. Claus	*J. prakt. Chem.*, 1860, **80**, 282; *Chemical News*, 1861, **3**, 194
2	N. P. Allen and W. E. Carrington	*J. Inst. Met.*, 1953–4, **82**, 525
3	L. Pauling	*Phys. Rev.*, 1938, (ii), **54**, 889
4	W. Hume-Rothery, H. M. Irving and R. P. J. Williams	*Proc. Roy. Soc.*, 1951, (A), **208**, 431
5	F. M. Lever and A. R. Powell	International Conference on Co-ordination Chemistry, London, April 1959; *Platinum Metals Rev.*, 1959, **3**, 90
6	A. R. Powell	Unpublished work

Improved Stainless Steel Reactor Material

RESISTANCE TO CORROSION INCREASED BY PLATINUM ADDITION

The corrosion resistance in uranyl sulphate and uranyl nitrate solutions of 304 stainless steel alloyed with small amounts of platinum or copper has been investigated as part of the reactor materials research programme of the Oak Ridge National Laboratory. Preliminary results reported by J. C. Griess *et al* in three recent Homogeneous Reactor Project Progress Reports (ORNL–2743, 2879 and 2920) show that the resistance to corrosion of the 18–8 steel is increased by the addition of small amounts of either element. Of the alloys investigated, 304 stainless steel containing 0.5 per cent platinum had the lowest corrosion rate.

Working at 250°C and at a solution velocity of 17 ft/sec with a heavy water solution containing uranyl sulphate and copper sulphate, it was found that the corrosion rate for 304 stainless steel was reduced from 35–36 mil/year to 15 mil/year by the addition of 0.5 per cent platinum. No significant improvement was observed at a higher solution velocity of 68 ft/sec. In a heavy water solution containing uranyl nitrate and copper nitrate, however, the corrosion resistance at 250°C of the steel was increased by the addition of 0.5 per cent platinum at both low and high solution velocities. At a velocity of 17 ft/sec the corrosion rates for the unalloyed and alloyed material were 10 and 1.6 mil/year respectively. With the same uranyl nitrate solution and a velocity of 70 ft/sec an even more significant decrease from 300 to 14 mil/year is reported. Further corrosion tests on the 0.5 per cent platinum-alloyed 304 stainless steel are to be undertaken in view of its possible applications in homogeneous reactors in which uranyl sulphate and nitrate solutions may be used as fuels.