The mechanism of this oxidative addition was followed by ^{31}P NMR which shows that the trans OH species is formed first and then rearranges to form the more thermodynamically stable cis complex. There is a very strong trans effect which follows the order H>P>SH>OCH_3>OH. The cis Ir-O-H angle is unusually small (91°). The reaction with methanol is different from that for water and the end product is the protonated complex $[IrH_2L_3]^+$ and formaldehyde, although the products do depend on the initial concentration of the reactants. The addition of ammonia to alkenes would be a useful reaction and thus analogies with the above reactions have been sought. The reaction of ammonia with the complex $[Ir(PEt_3)_2(C_2H_4)_2]Cl$ in THF at 25°C produces an ammine-bridged bi-iridium complex, with the release of Cl_2 and ethene.

The Fourth Conference

During the week the oral presentations gave an insight into the current state of research on the chemistry of the platinum group metals. Some of the most recent work was presented in the poster sessions which gave an opportunity for informal discussion. The continued high level of academic interest in this area may well result in new opportunities for commercial developments, and can be expected to lead to further useful discussions at the fourth conference in the series, which is to be held in Cambridge in 1990.

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Weldability Test for Thin Iridium Sheet

The use of iridium alloys doped with thorium to encapsulate the $^{238}PuO_2$ radioactive heat sources used in thermoelectric generators which provide stable electrical power during outer planetary missions has been reported here previously (1, 2). These iridium alloys possess high melting point, good high temperature strength, resistance to oxidation, and are compatible with both the fuel and the surrounding insulation materials. The thorium serves as a grain boundary strengthener, segregating to the grain boundaries and inhibiting intergranular fracture.

A container is formed by joining together two hemispherical cups and, because of the application, the equatorial weld is required to be totally reliable. An improved method of welding has been developed for this purpose (3).

Iridium alloys may suffer from hot cracking during welding, and experience indicates that even when approved specifications and welding procedures are followed variations in weld quality can occur. Clearly defective welds represent a waste of both materials and fabrication costs. Thus if the weldability of a material can be established prior to or early in the manufacturing process, significant savings will result.

Standard tests to determine the hot cracking tendency of metals and alloys do exist, but these are most suitable for sections thicker than 2.5 mm. Now, however, workers at the Oak Ridge National Laboratory have developed a simple modified circular plate test which will successfully determine hot cracking susceptibility (4).

Sheet specimens 50 mm in diameter and 0.63 mm thick are held in a test fixture which is designed to restrain them at the centre and the periphery. Using a gas tungsten arc welding procedure under an inert atmosphere, two circular concentric autogenous welds are made, then the disc is removed, turned over, replaced, and the procedure repeated. The first weld is 35 mm in diameter and the other 22.3 mm; after inversion the welds are repeated in the same order.

The first welding sequence produces a microstructure which is susceptible to cracking and it also increases the stress in the specimen. If cracking does not occur, the disc is then inverted and the process repeated. After the second sequence, a lack of evidence of cracking in either of the two circular welds is taken to indicate a weldable alloy. If the smaller but not the larger diameter weld shows cracking the material is regarded as being susceptible to cracking, but if both welds are cracked the material is classified as highly susceptible to cracking.

References

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