since, as far as is known at present, they all form unbroken solid solutions. At lower temperatures, ordered structures of the CuAu and Cu_3Au type occur in many of these alloys and some of these give rise to interesting magnetic properties, in particular in the platinum-cobalt series. Considerable interest has, in fact, been shown recently in this system since some of the alloys can develop higher values of coercive force and can produce more powerful magnets than any other known permanent magnet material.

The alloys of the platinum metals with manganese are, as may be expected in view of the many modifications of manganese, extremely complex. The face-centred cubic gamma phase of manganese is retained down to room temperature by addition of the platinum metals, except in palladium-manganese alloys where the gamma manganese solid solution decomposes eutectoidally. The platinum-manganese alloys have an ordered structure which is ferromagnetic and it is possible that further studies of the alloys of manganese with the platinum metals might yield materials with interesting magnetic properties.

When it comes to alloys of platinum metals with Group VIA metals conditions become very complicated. Sigma phases are found in all alloys of the close packed hexagonal platinum metals with these metals and in some of the alloys ferromagnetism is observed. Particular attention has been given to the magnetic properties of the chromium-iridium and chromium-rhodium alloys.

Finally, the alloys of the platinum metals with metals of Groups VA and IVA can be shown to exhibit several systematic relationships. The principal intermediate phases formed can show the structures of caesium chloride, sigma, Laves and β-W phases. It is considered remarkable, however, that sigma phases of alloys in this group are comparatively rare and in particular that only two cases of sigma structure, osmium-tantalum and osmium-niobium, have been found in the alloys of the close packed hexagonal metals with metals of the VA Group.

J. C. C.

TEMPERATURE CONTROL IN THE ZINC BLAST FURNACE

A major development in British extraction metallurgy—a process for smelting lead-zinc concentrates in a blast furnace to yield both zinc and lead as metals directly—has been brought to commercial success by the Imperial Smelting Corporation Ltd. Two furnaces are now in operation at Avonmouth, producing between them 70 tons of zinc per day and varying quantities of lead, depending on the nature of the charge.

Instrumentation and automatic control are features of the process, and a battery of platinum : rhodium-platinum thermocouples is installed for the measurement of temperatures in the higher ranges.