

itself is relatively inert at room temperatures, but becomes very corrosive at elevated temperatures. It will attack many of the more commonly used bursting disc materials, such as aluminium, nickel, or Monel. Platinum, however, has an excellent resistance to BCF at high temperatures and is used by Graviner in extinguishers for fire fighting in aircraft engines, Figure 1. The extinguisher is fitted inside the engine cowling and, in the case of the Rolls Royce Olympus engine, may experience temperatures as high as 400°C.

A life of five years is expected from these discs, but the foil from which they are made is only 0.005 inches thick and the outside diameter a little more than half an inch. After manufacture, the discs are silver brazed into a retaining brass boss, which ensures no leakage or drop in pressure, Figure 2. The bursting pressure of 1200 psig is critical, and a tolerance of only  $\pm 5$  per cent is allowed. A platinum disc assembly can provide this high integrity.

A major hazard with any volume of com-

pressed gas is its explosive potential if heated. A fire extinguisher not fitted with a bursting disc, but surrounded by flame, will eventually explode, with catastrophic results. The use of a disc on all extinguishers, and particularly in aircraft engines, is therefore a vital safety feature in case of fire engulfment.

If a fire develops in an engine, the extinguisher may be electronically activated from the flight deck. When the BCF is released it displaces oxygen from the atmosphere and smothers the fire.

## Conclusion

Any closed vessel likely to experience over-pressure conditions must be protected against damage to itself and its surroundings by a pressure release system, and bursting disc systems are an accepted way of achieving this. The high temperature corrosion resistant properties of platinum make it an obvious choice for bursting discs to be used in particularly harsh environments.

# Homogeneous Catalysts of the Platinum Metals

The advantages of employing catalysts that are soluble in the reactant are being increasingly appreciated in the chemical and pharmaceutical industries where their high activity per unit weight of metal, high selectivity and great endurance offer important savings.

To assist those working in a research, development or production role who may be considering homogeneous catalysis as a solution to their problem a 54 page book has now been prepared by Johnson Matthey Chemicals Limited. In the first of two major sections a summary is given of the principles of homogeneous catalysis and of the advantages that it offers. This is illustrated by the success of the Joint Union Carbide—Davy McKee—Johnson Matthey low pressure rhodium catalysed hydroformylation of propylene to *n*-butyraldehyde that is now in large scale operation in a number of plants to the extent of over one million tons per year. The main features of homogeneous catalysis employing compounds of the platinum metals include the only possible route to some products as well as economic advantages such as high yield, lower

capital and operational costs and operation at lower pressures and temperatures than those generally associated with heterogeneous catalysis.

In the second section a list is given of over 120 compounds of platinum, palladium, iridium, rhodium, ruthenium and osmium that are known to act as homogeneous catalysts, with their solubility data and with some 200 references to the relevant literature on their use in homogeneous catalysis and classified by reaction type, while advice on their safe handling is included. All are available as research samples and many in bulk for production scale use.

The commercial success of a homogeneous catalytic process can be affected by the efficiency with which the catalyst can be recovered and the metal recycled. A number of methods have been developed by Johnson Matthey Chemicals and the service offered for this operation is also summarised.

The publication is available from Johnson Matthey Chemicals Limited, Orchard Road, Royston, Hertfordshire, or from any Johnson Matthey office throughout the world.