

## **DEVELOPMENT AND APPLICATIONS OF A PREPARATIVE SCALE SAMPLE CONTROLLED THERMOGRAVIMETRIC SYSTEM**

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The successful development of a high sensitivity SCTG system [1] resulted in the construction of a larger scale sample controlled thermobalance, which enables samples of 500 mg and above to be studied. One objective of the system was to allow the preparation, under precisely controlled thermal conditions, of sufficiently large amounts of coal chars that could then be characterised using a range of analytical techniques.

The thermobalance is based on a five decimal place top pan balance and a high temperature water-cooled furnace, located above the balance, allowing operation to 1000°C. A gas diffusion chamber situated between the balance and the furnace permits work to be carried out in an upward flow of air or of an inert gas. Samples in excess of 1 g can be studied using a quartz crucible. However, for the coal samples a smaller platinum crucible was used to reduce the noise level, with a sample mass reduced to 500 mg. The data acquisition and control systems are a development of those used for sample controlled studies based on evolved gas techniques [2]. A number of strategies relating the rate of mass loss to the heating rate are available and the control software allows 'stop-mass' experiments in which chars can be produced to any pre-selected degree of pyrolysis.

The performance of the system is illustrated by decomposition studies on selected inorganic compounds and its application to coal pyrolysis and oxidation studies are discussed.

### **Reference**

- 1 E. L. Charsley, J. J. Rooney, H. A. White, G. M. B. Parkes and P. A. Barnes, Poster presented at 8<sup>th</sup> ESTAC, August 25–29 2002, Barcelona, Spain
- 2 P. A. Barnes, G. M. B. Parkes and E. L. Charsley, *Anal. Chem.*, 66 (1994) 2226.

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