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(54) FURNACE FOR DIFFERENTIAL THERMAL ANALYSIS

(71) We, BAYER AKTIENGESELLSCHAFT, a body corporate organised under the laws of the Federal Republic of Germany, of 509 Leverkusen, Federal Republic of Germany, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The invention relates to a furnace for differential thermal analysis of long duration, in which relatively large quantities of samples are examined. Large sample containers are required when carrying out differential thermal analysis with large quantities of samples, for example at very slow heating rates. The large containers naturally require correspondingly large furnaces in which the temperature frequently varies from one location to another. Relatively large temperature gradients are obtained within the furnace when heating the furnace, particularly in the area of the upper cover of the furnace or the lower seal. These lead to variations in temperature not only in the furnace but also, when using large quantities of samples, within the sample itself. Measurements can be falsified in this way.

The object of the invention is accordingly to provide a furnace in which the temperature is as spatially uniform as possible, for carrying out differential thermal analysis of long duration, in other words for examining large volumes of samples.

According to the invention there is provided a furnace for differential thermal analysis of long duration, which comprises two halves having equal heat capacities, each half having two bores each of which is aligned with a respective one of the bores in the other half, the bores being of the same size as one another, and each pair of aligned bores serving to receive a sample container or comparison material container, additional bores being provided in one half for thermoelectric sensors.

The two halves of the furnace are advantageously provided with filament windings which have the same electrical resistance.

In a furnace of this type, a highly uniform distribution of the temperature may be obtained. This enables very precise differential thermal analyses to be carried out at extremely low heating rates down to 10^{-2}°C min^{-1}.

An embodiment of the invention is described in more detail below with reference to the accompanying drawing, which is a cross-section through a differential thermal analysis furnace having two generally symmetrical halves, an upper half 1 and a lower half 2. Two large bores 3 are provided symmetrically to each other in the two halves for receiving a sample container 4 and a container 4*a* for a comparison material, and smaller bores 5 having the same diameter are provided in the lower section 2 for receiving differential thermoelectric sensors 6 and optionally control elements. The sample container 4 may have a volume of, for example, about 20 cm^3.

Both halves of the furnace 1 and 2 are provided with filament windings 5 in their external jackets so that the same heating power is generated when a given voltage is applied in each half of the furnace. The heating rate is adjusted in such a way that the temperature in the comparison material rises linearly with time. The comparison material must not undergo an endothermic or exothermic reaction in the temperature range being used for the test. If the difference between the temperature of the sample and the temperature of the comparison material is plotted as a function of temperature, the desired differential thermal analysis diagram is obtained.

WHAT WE CLAIM IS:—

1. A furnace for differential thermal analysis of long duration, which comprises two halves having equal heat capacities, each half having two bores each of which is aligned with a respective one of the bores in the other half, the bores being of the same size as one another, and each pair of aligned bores serving to receive a sample container or com-

parison material container, additional bores being provided in one half for thermoelectric sensors.

2. A furnace according to Claim 1, wherein the two halves of the furnace have filament windings of equal electrical resistance.

3. A furnace for differential thermal analysis, substantially as herein described with reference to the accompanying drawing.

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1 SHEET *This drawing is a reproduction of the Original on a reduced scale*

