LABORATORY EQUIPMENT AND TECHNIQUES

AN IMPROVED METHOD OF PREPARATION OF SPHERICAL SAMPLES FROM FERRITES AND METALLIC ALLOYS USED IN SOME MAGNETIC MEASUREMENTS

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A very simple method is presented for the preparation of spherical samples from ceramic materials and metallic alloys. No use of compressors or specially shaped grindstones is required. The method permits simultaneous treatment of several samples of different chemical composition.

In magnetic measurements made by means of the Faraday method with the help of a balance as well as in the magnetic resonance there is the requirement of spherical shape of samples. However, it is not always easy to obtain such shape using standard lathing technique. Therefore several methods of sample working have been developed to obtain spherical samples of arbitrary small diameter.

The method presented in this paper is essentially an improved version of that described in a previous paper [1]. In case of ceramic materials the preparation of samples is the following. After preliminary sintering of the constituents the product is ground to powder of possibly small grain size and next compressed to small pellets, of 5–6 mm diameter. Spherical samples of diameter of about 4 mm are made from these pellets by means of the well known Bond method [2], [3]. According to this method such spheres can be obtained by working to pellets with the help of two sharpened tubes, as shown in Fig. 1. Such spherical samples are sintered again at suitable temperature, and then their diameter is decreased using the method published by the author [1]. Fig. 2 shows a schematic illustration of the device used for sample grinding. A small mechanical grinding machine is fastened in a support, its axis being vertical so that the grindstone rotates in a horizontal plane. The grindstone (K) is enclosed by a housing (D) attached to the frame of the grinding machine. Holders (U) holding the tubes (R) are attached to the support (S). The inner walls of the tubes are cov-

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ered with abrasive material. The distance batween the edge of the tube and the grindstone is set to about 0.5 mm. Each tube can be filled from the upper side by spherical samples of the same composition their number depending on the diameter of the tube. Different tubes can contain samples of different chemical composition. If the samples are made of completely different substances the tubes may be placed radially whereas in case of samples made of the same materials but of different composition the tubes should be rather placed along the

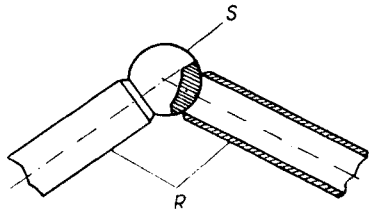

Fig. 1. Preliminary treatment of sample. S — sample, R — sharpened tubes

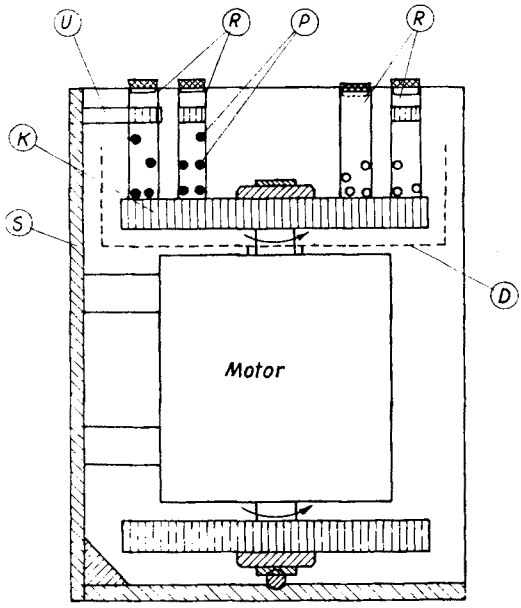

Fig. 2. Schematic drawing of the grinding device. K — grindstone, R — tubes containing the sample, P — samples, U — holders, D — grindstone housing, S — support

circumference. After plugging up the tubes the grinding machine is set in operation and the shape of the sample checked from time to time. The grinding velocity depends on the grindstone. To obtain a comparatively smooth surface of the samples, after preliminary rough grinding and diameter decrease the grindstone is covered with abrasive cloth of small grain size and the grinding is continued. Thus the diameter of the samples is rapidly reduced by repeated collisions of samples with one another as well as with the grindstone (or abrasive cloth) and the wall of the tube, up to several tenths of a millimeter. If a particularly polished

ACTA PHYSICA POLONICA Vol. XXXV (1969) Fasc. 3

surface is required, each sample must be afterwards treated individually using suitable abrasive powders. In this way one can also treat metal samples previous modelling into spherical shape or in case of hard materials into an approximately spherical polyhedral shape.

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ACTA PHYSICA POLONICA Vol. XXXV (1969) Fasc. 3