that the textural features of the plessite (including taenite rims) may be examined over a relatively large area, and thereby seen in relation to other features present.

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Use of a rotating magnetic field for chondrite meteorites and mineral separations

IN a number of analytical schemes for the bulk chemical analysis of chondritic meteorites (Prior, 1913; Moss *et al.*, 1967; Easton *et al.*, 1981) a clean separation of the metal (magnetic fraction) from the silicates and sulphides (non-magnetic fraction) is required, so that elements found may be accurately assigned to the correct mineral group (metal, silicate, or sulphide). Conventional methods of separation (e.g. isodynamic magnetic separator, heavy liquids) fail for a variety of reasons including difficulty in handling small irreplaceable samples and separated fractions.

The first recorded magnetic separation of metal from a meteorite is attributed to Howard (1802). Since that time various designs of hand-held magnets (e.g. bar, comb, horseshoe) have been used for separations. Prior used magnetic combs in his meteorite separations (e.g. Prior, 1916) but when using them with finely divided dry powders, some dust-sized non-magnetic material (silicates and sulphides) always accompanies the extracted metal.

During the analysis of a number of chondritic meteorites (Easton, 1982), it was found that fewer dust-sized silicate and sulphide particles adhered to the metal when a preliminary separation was made using a laboratory magnetic stirrer with a variable speed control, as in the procedure described below.

The crushed sample of chondritic material ($< 120\ \mu m$) is placed on the outer edge of a sheet of glazed paper supported on a magnetic stirrer. The permanent magnet within the stirrer is rotated at 100-200 r.p.m. so that the magnetic particles are drawn from the powdered sample and travel along a spiral path towards the centre of the rotating magnetic field. Each attracted particle rotates under the influence of the rotating magnetic field, and thereby frees itself from adhering non-magnetic material, either by friction with the surface of the paper or by collision with other particles during its movement towards the centre. Further cleansing occurs near the centre where the magnetic particles newly aggregated rotate as a mass in the opposite direction to the approaching particles. As a result of collisions between the approaching particles and those aggregated, a ring of non-magnetic material is deposited around the periphery of the centrally rotating magnetic mass. A sample in the process of separation is shown in fig. 1.

The non-magnetic powder on the outer edge of the paper is disturbed periodically using a fine brush, to ensure that magnetic particles are not trapped within the bulk of the sample. The periodic disturbance is continued until the magnetic separation is complete, indicated by the absence of magnetic particles moving towards the centre. When the separation is complete the rotating magnetic field is stopped and the glazed paper lifted vertically to avoid disturbing the separated fractions

The magnetic fraction is removed from the centre

FIG. 1. Sample in process of separation; magnetic particles travel along a spiral path towards the centre of the rotating magnetic field.

of the paper using a magnetic comb, and brushed from it on to another sheet of glazed paper placed on the surface of the magnetic stirrer, with the permanent magnet stationary. Dust-sized magnetic particles are drawn downwards and easily retained on the paper by the magnetic field. The paper is lifted vertically off the magnetic stirrer, and the magnetic fraction transferred to a container for storage. This procedure avoids the loss of magnetic fines that occurs if the separated fraction is brushed directly into a container.

Although the separation procedure is used mainly with chondritic meteorites, it has been used also to effect mineral separations when the magnetic susceptibility of the mineral and its matrix are sufficiently different.

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