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Polyvinyl Acetate–Methyl Alcohol Solution as a Scanning Electron Microscope Particle Mounting Medium

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Abstract

A polyvinyl acetate-methyl alcohol solution forms an excellent mounting medium of controlled size and thickness for mounting inorganic particles larger than 20 micrometers.

Introduction

A modification of the technique described by McCandless, McKay, and Ladle (1971) allows greater control of the amount of polyvinyl acetate[1] (PVA) applied to scanning electron microscope mounts. Previously, if insufficient PVA was applied to the substrate, the particle would not adhere; conversely, when too much was used, the particle would submerge when heated. The suggested modification permits the preparation of particle mounts of controlled size and thickness. The technique has been used to mount lunar particles as small as 20 micrometers.

Method 1

PVA is dissolved in methyl alcohol (MA) in a ratio of 1:10. This ratio should be considered as a starting value and changed as necessary to meet the demands of the individual user. Using a probe or needle, place a droplet of the solution on a carbon planchet, coverslip or other substrate. Individual droplets of the solution, no larger than the diameter of the specimen, can be produced with some practice. Within a few seconds the droplet will "dry", turning from a clear droplet to a thin white film. Place the substrate in an aluminum-foil weighing dish on a hotplate set for about 140°C. After five to ten seconds of heating the white film will bubble and again become clear. Using a vacuum needle or tweezers, place the grain in the hot PVA and then remove the weighing dish from the hotplate.

Method 2

Alternatively, the substrate may be removed from the hotplate following the formation of the clear film. After positioning the particle on the cool film of PVA, reheat the substrate to 140°C for five to ten seconds so that the grain adheres. The PVA will turn brown if heated for several minutes or if the temperature is too high. Particles smaller than 50 micrometers are best mounted on a smear of PVA-MA using the second method. Particles as small as 20 micrometers can be securely mounted with a minimum of surface wetting. The substrate can then be glued to the sample stub and coated as required.

It may be desirable to recover the grain for further analysis or perhaps to remount the sample to view a different surface. All traces of the PVA can be removed from the grain with several washings in methyl alcohol. Carbon planchets are excellent substrates because they contribute minimal background noise during X-ray analysis and are easily inscribed with sample name or number.

References

MCCANDLESS, R. M., D. S. MCKAY, AND G. H. LADLE (1971) The use of polyvinyl acetate in the preparation of scanning electron microscope mounts of small particulate material. *Am. Mineral.* **56,** 1114–1115.

[1] PVA type AYAA, blend 112, Union Carbide Corporation, 270 Park Avenue, New York, New York 10017.