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A METHOD FOR ISOLATING GRAINS MOUNTED IN INDEX OILS*

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In investigating an assemblage of minerals, as in the study of detrital heavy minerals for correlation purposes, an estimation of the relative abundance of each mineral is made by counting the component mineral grains in an oil mount. The minerals are then identified by their crystal form and grain shape, and by their optical properties. The mineral grains are placed on a slide, and an index oil is spread thinly over them, forming a flat surface, above which the grains should not project. A cover glass need not be used when counting grains. If an unknown mineral is present, it may be isolated for further study in the manner outlined in this paper.

In the method described by Reed[1] and that by Calkins[2] the grain is removed from the oil by means of a wire that has been dipped into an adhesive substance (Canada balsam, vaseline, etc.). In the procedure here described the grain is removed by means of a glass dropper which offers the advantage of transferring the unknown mineral without the use of Canada balsam or vaseline, which are slowly soluble in index oils.

A low-power objective is used to give the maximum amount of working room between the slide and the objective. The dropper is made by heating and pulling out a glass tube having an inside diameter of 4 mm., so that the capillary has a diameter slightly larger than the grains on the mount. A bulb made from a section of rubber tubing about 5 cm. long, closed at one end, is fitted to the dropper. The completed dropper is 12–15 cm. long. This glass dropper is held nearly vertical over the unknown mineral, and then lowered into the oil. The mineral with some immersion oil is sucked into the dropper and transferred to a clean slide without release of pressure on the bulb of the dropper. If the first slide is thick with

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[2] Calkins, F. C., Transfer of grains from one liquid to another: *Am. Mineral.*, **19,** 143–149 (1934).

grains, it may be desirable first to isolate the mineral from the others with a steel needle.

On the new slide the excess liquid is absorbed on lens paper wrapped around a pointed match stick. Care should be taken not to touch the mineral grain with the lens paper as the grain may adhere to the paper. Two procedures may be used in removing the remaining index oil: (1) The new index oil may be added to the slide to dilute the first oil. The excess liquid is taken up with a fresh piece of lens paper. Application and removal of the oil is repeated several times until there is no effect from the old oil. More applications are needed in the case of widely separated index oils than in oils with indices in the same range. This method for removing index oils is that which has been used in the Geological Survey for changing index oils in glass prisms. (2) A few drops of acetone may be placed on the slide. The acetone is immiscible with the index liquid and pushes the oil away from the mineral grain, where it is removed with a fresh piece of lens paper. Washing with acetone is repeated until the mineral grains are perfectly dry and clean. Three to five treatments are necessary. If difficulty is experienced in removing the index oil, a treatment with xylene, which is miscible with both the index oils and with acetone, may be substituted for one of the acetone washings. The last washing should be with acetone as the xylene does not evaporate quickly.

Any desired index oil may be placed on the mineral after removing the first oil. If more than one oil is necessary, the preceding oil may be removed by repetition of either procedure. A cover glass should be used when determining the index of refraction of the mineral. Tweezers are helpful in removing the glass for further study with index oils.

If it desired to preserve the minerals in the original mount, they can be washed from the slide into a 5 or 10 cc. beaker with a little acetone from the dropper. The excess liquid is decanted. The minerals may be washed in xylene, in which the index liquids are miscible, and dried in acetone. They may then be mounted in Canada balsam.