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A new device for separating minerals by means of heavy liquids.

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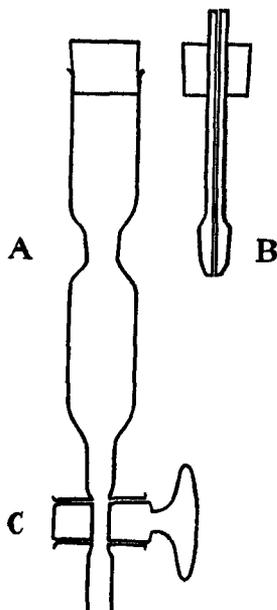
[Read January 22, 1901.]

DURING the investigation of a zeolite it became necessary to separate small quantities of zeolitic material from a mixture of calcite and other heavier minerals; this could be done most easily by using a liquid of such density that the zeolite just floated, while all the other minerals sank to the bottom. A solution of potassium-mercuric iodide could not be used, as this reacts chemically with zeolites and alters their composition; acetylene tetrabromide diluted with benzene was therefore chosen, and in consequence the apparatus had to be made entirely of glass. Certain difficulties were found in using the ordinary form of glass separating apparatus, and to overcome these the form here described was devised.

The accompanying figure shows the apparatus in section and about one-third its actual size; it consists of a glass tube A, about 22 cm. long, and 2.5 cm. wide, slightly constricted in the middle, and closed by a wide-bore Geissler-tap C at its lower end. The powdered mixture of minerals is introduced into A with an organic liquid of suitable density for separating its lightest or heaviest constituent. The tube is closed by a cork or glass stopper to prevent evaporation and consequent change of density in the liquid. It is gently shaken by short, rapid movements, up and down and from side to side, so as to allow the lighter particles to rise,

and by continuing this long enough it is possible to prevent the entanglement of either light or heavy particles in the wrong part of the liquid. It is also advisable to incline the tube at an angle of 45° , rotating it and tapping it at the same time, to make sure that no particles are adhering to the glass near the constriction.

When the separation seems to be complete, the cork is taken out and replaced by another carrying the capillary-tube B, which is thickened at its lower end and ground so as to fit the constriction in A. When B has been pushed home, the lower tap is opened and the liquid flows out, carrying with it the heavier portions of the powder; these can be filtered off, and the heavy liquid is ready for use again.



Separator.

Some particles always remain attached to the inside of A; these are washed out with the liquid that is being used as a diluent (in this case benzene) by sucking up a little through C by means of a rubber-tube attached to the end of the capillary-tube B, then closing the tap C, swilling out the tube, and letting the liquid run out of the tap again. By repeating this operation the lower chamber can be freed from any trace of solid; and by closing the tap C and removing the capillary-tube the liquid flows down from the upper chamber, and if required can be allowed to flow out and can be filtered like that from the lower, the adhering particles being washed

out with the same lighter liquid.

The apparatus has mainly been used in cases where it was required to separate a very small percentage of the lightest constituent from a large quantity of material, and it was found convenient not to remove the lightest portion from the apparatus at the end of each separation, but when the heavier part has been removed, the liquid is poured in again, another portion of material added, and the process repeated. In this way the lightest portion is concentrated and no loss is incurred by successive separations; and the method gives very satisfactory results both as regards yield and purity.

The following were found to be the chief advantages over the ordinary forms of 'all glass' apparatus.

In other 'all glass' separators, after the powdered mixture has been separated by the heavy liquid, the latter is allowed to flow out at the bottom of the tube in which the separation has taken place, and, when only the lightest solid remains, the flow is interrupted by turning a tap or inserting a ground-glass plug. In both cases some solid is apt to get into the joint and spoil the experiment and not infrequently break the apparatus. This possibility is prevented in the apparatus described, as the tube B is inserted while the liquid is at rest and it is easy to see that there are no particles in the joint. Another advantage is the possibility of using it as a concentrator in the way mentioned.

The apparatus can be obtained from Messrs. Müller, Orme & Co., 148 High Holborn, London.