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The Use of Flotation Techniques to Separate Quartz from Feldspar

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We have been successfully using the flotation technique to separate quartz from feldspar prior to TL dating for one year but it became evident at the Helsingør Seminar (July, 1982) that this 25 year old method is still generally unknown in the TL field. Accordingly, we briefly recall here the principle of the very effective Hallimond cell and supply some bibliographic references on flotation.

The technique consists of selectively carrying away certain minerals from a mixed powder with gas bubbles. The buoyancy of a mineral depends on its surface properties and is hardly affected by its density or physical characteristics. The buoyancy of quartz and feldspar is nil but can be enhanced for feldspar with a "collector" so that it can be floated away by bubbles.

The Hallimond cell is composed of two parts (figure 1):

- the lower part (45 cm³) is fitted with a sintered glass plug and can be placed on a magnetic stirrer.
- the upper part is forked; one branch for filling and the other for recovering the floated minerals.

The two parts are joined by a ground-glass joint.

The cell is used in the following manner:

1. - 0.25 grams of octadecylamine ($\text{CH}_3(\text{CH}_2)_{17}\text{NH}_2$) collector is diluted in 500 cm³ of water (20°C), a few drops of pine oil or liquid soap added (foam stabilizer-not compulsory) and the pH adjusted to 2-3 with HF (to reduce the buoyancy of the quartz). This is then poured into the cell along with 1-1.5 grams of the powder of quartz and feldspar. The minerals should be cleaned with acids (HF, HCl, etc.) before their introduction so that clean surfaces are exposed to the liquid. Heavy minerals should also be removed (using heavy liquids, for example) if present.
2. - The stirrer is turned on and the gas tap opened.

The efficiency of the cell depends on many factors including grain size, surface state, bubbling rate and pH. Optimally the separation should not take more than 15 minutes. If difficulties are encountered, one of the conditions should be changed and, if necessary, another collector used (e.g., sodium xanthate, potassium ethyl xanthate or sodium oleate). The final, separated powders should be rinsed thoroughly with acetone as the octadecylamine has poor solubility.

We have achieved very good results with the quartzo-feldspathic fraction of granites, with detritic sand and with the xenolithic inclusions of volcanic projections (Miallier, et al., 1982).

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Figure 1: Flotation Apparatus

