LETTERS TO THE EDITOR

RADIO-METRIC DATING OF THE DALHOUSIE GRANITE

In recent years, radio-metric dating has become an important tool for research in earth sciences. However, not much work has been done in this field in India. In particular, only scanty radio-metric data is available for the vast Himalayan terrain. Whatever is available consists mainly of mineral ages, obtained by use of K-Ar technique through analyses in laboratories outside India. Recent studies[1] in case of many samples belonging to poly-metamorphic regions have indicated an excess or loss of radiogenic Argon resulting from its diffusion from the original source over appreciable distances during the long geological time. As an example, Saxena and Miller[2] obtained apparent ages as large as 4100 m.y. and 4250 m.y. for two minerals of N. W. Himalaya. The authors stated that significance of these apparent ages was doubtful. This is an indication that K-Ar mineral ages for the Himalayan terrain require a very careful scrutiny and interpretation. In comparison, Rb-Sr whole rock method has been demonstrated[1] to be, in general, free from similar problems.

For the Himalaya, the only whole-rock Rb-Sr data so far available is that of Jager *et al.*[3] who determined an age for the Mandi granite of Himachal Pradesh (India). The present communication describes the preliminary results for the age of the Dalhousie granite, H.P., by use of this technique. PHS/17 is one of the first samples which has been analysed. This is a course-grained granite which contains a fairly good amount of biotite as well as muscovite. Small-sized porphyroblasts of white felspars are also present. This sample was collected from Matuna (Longitude 76° ; Latitude 32·5°) near Dalhousie.

The data has been obtained by use of a Nier-type of Mass spectrometer of 25 cm radius equipped with an ion-source for solid samples, which was fabricated and provided to us at Chandigarh by Bhabha Atomic Research Centre, Bombay. Pending the availability of an isochron, the initial value for Sr^{87}/Sr^{86} was taken as 0·7091. Decay constant for Rb^{87} was taken as $1·47 \times 10^{-11}$ per year. Our analyses have given the following results:

$Rb^{87} = 94·5$ ppm ; Sr^{87}, radiogenic $= 0·633$ ppm

Common Sr $= 33·6$ ppm ; $Sr^{87}/Sr^{86} = 0·890 \pm 0·015$

Apparent Age $= 456 \pm 50$ million years.

The above value agrees within experimental errors with the age of the Mandi granite, *viz.*, 500 ± 100 m.y., obtained by Jager *et. al.*[3]. It is quite likely that the two outcrops are of equivalent age.

Work is in progress for obtaining an isochron-age for the Dalhousie granite. This is estimated to be a few percent lower than the value given above. There is no doubt, whatsoever, that the Dalhousie granite is not a tertiary granite.

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DEPENDENCE OF SURFACE TENSION OF LIQUID HELIUM I ON THE TEMPERATURE AND THE DENSITY

It is shown that for liquid helium I (a liquid with a very low boiling point), the dependence of surface tension on the temperature and the density is governed by the well-known relations, such as, the Eötvos rule[1] and the Sugden relation[2], which are obeyed by the normal non-associated liquids. Further, the values of the Eötvös constant and the "Parachor" for liquid helium I are calculated.

Eötvös has shown that the surface tension of normal non-associated liquids obeys the relation,

$$S = \frac{K_E T_c}{M^{2/3}} \left[\rho^{2/3}\left(1 - \frac{T}{T_c}\right)\right],$$

where S=Surface tension, M=gram-molecular weight, ρ = liquid density, K_E = Eötvos constant, T = temperature, and T_c = critical temperature. This relation is tested for liquid helium I by drawing the graph of S against $[\rho^{2/3}\,(1 - T/T_c)]$. The values of surface tension from Devaraj and Hollis Hallett[3] and the density data from Kerr[4] are used. It is observed that liquid helium I obeys quite well the Eötvos rule. The Eotvos constant (K_E) for liquid helium I is calculated from the slope of the straight-line graph and is found to be 1·06.