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Physical and radioactive properties of rocks from East Antarctica

G.V.S. P. RAO, G. KOTI REDDY, S.R. SHARMA and T.S.M. HUSSAIN
National Geophysical Research Institute, Hyderabad- 500 007, India

We report here the physical and radioactive properties measured on rocks from Schirmacher Oasis (Lat: $70^0 47'$ to $71^0 44'$ S; Long:$11^0 22'$ to $11^0 55'$E), East Antarctica. The exposed Precambrian crystalline basement consist of both acidic and basic rocks. The acid rocks consist predominantly of garnet-biotite gneiss (cordierite, sillimanite, graphite), augen gneiss, quartzo-feldspathic gneiss and minor pegmatites. The basic rocks are mainly pyroxene granulites, amphibolite, lamprophyre, gabbro and its equivalents, which occur mostly as intrusives.

Measurements were carried out on rock samples collected from six different sites of Schirmacher Oasis during Indian Scientific Expedition to Antarctica. Magnetic susceptibility of the specimens was measured using a Susceptibility and Hysteresis Apparatus and magnetic intensity was measured using a Spinner Magnetometer. Density and porosity were measured using conventional methods. Radio elemental concentrations were measured by Gamma Ray Spectrometer

Magnetic susceptibility of these specimens show a variation between 14.0 and 43.0 x 10^{-6} S.I. Units and Magnetic intensity varies from 1.05 to 1.58 mA/m. Density and porosity of these samples vary from 2.55 to 2.80 g/cc and 0.20 to 0.44 % respectively. The radioactive concentration of Uranium varies from 0.92 to 41.65 ppm, for Thorium and Potassium it vary between 1.39 to 63.29 ppm and 1.42 to 4.58 % respectively. Estimated radioactive heat generation range from 0.46 to 15.74 μWm^{-3} with an average of 4.0 μWm^{-3}. These results show that the samples are associated with weak magnetization, average density, high porosity and large variation in radioactive elemental concentration. High radioactive elemental concentration is due to its radioactive elemental content as well as the proximity of pegmatite in the sampling locations. These properties and their correlation are discussed in the light of geological process in Schirmacher Oasis.