OCCURRENCE OF NEPHELINE SYENITES WITHIN THE PASUPUGALLU GABBRO-ANORTHOSITE PLUTON, PRAKASAM DISTRICT, ANDHRA PRADESH

Y. JYOTHENDER REDDY and
C. LEELANANDAM
Department of Geology, Osmania University, Hyderabad 500 007, India.

ALKALINE bodies of variable extent were reported from Kotappakonda[1], Elchuru[2,3], Settupalle[4,5], Purimetla[6], Uppalapadu[7] and Podili[8] in the recently recognized Prakasam Province of Andhra Pradesh[9,10]. The purpose of this note is to record two more occurrences of very minor nepheline syenite bodies within the gabbro-anorthosite pluton[11] located near Pasupugallu (15°48′N and 79°48′E) in the Prakasam District of Andhra Pradesh.

The oval-shaped Pasupugallu gabbro-anorthosite pluton is situated about 5 km SSW of the Purimetla nepheline syenite pluton[6] and 30 km NNE of the Uppalapadu nepheline syenite pluton[7]. A minor nepheline syenite tabular body measuring approximately 100 × 0.3 m, with an E–W trend, occurs in the leucogabbro, about 2½ km SE of the village Botlapalem (15°44′N and 79°46′E) in the southern part of the Pasupugallu pluton. Though the contacts between the nepheline syenite body and gabbros are covered by soil, one can easily conclude that the body is a dyke intrusive into gabbros.

The nepheline syenite is coarse-grained (some nepheline crystals measuring 2.5 × 2 cm), grey-coloured and massive; it exhibits porphyritic texture both in hand specimen and in thin section. Under the microscope, the rock exhibits hypidiomorphic granular texture. Potassium feldspar perthite (65% by vol.) and nepheline (22%) form phenocrysts, while potassium feldspar perthite, biotite (5%) and other accessories form ground mass. The accessories include corundum (2%), zircon (2%), calcite (1%), spinel (1%), opaques (1%) and rare plagioclase and apatite. Nepheline is mostly euhedral and occurs as phenocrysts with corroded borders; it alters to dusty material along the cracks and is partially replaced by fine-grained micaceous aggregate; the mineral carries the inclusions of sub-hedral corundum (with rare lamellar parting), potassium feldspar, zircon, biotite (flakes), plagioclase and rare apatite (needles). The near absence of plagioclase qualifies the rock to be termed as "foid-syenite"[12].

The other occurrence of nepheline-bearing rock is a pegmatitic body exposed about 2½ km ESE of the village Botlapalem. It has a N35°E trend and occurs as a discontinuous body for over 200 metres with a width of 10 metres. This occurrence is characterized by very coarse nepheline crystals up to 10 × 5 cm. The contact with the gabbros is not clear as it is covered with the soil. The pegmatite body is larger in area and appears to be deformed than the dyke. The rock comprises chiefly of plagioclase, nepheline, biotite, cancrinite and minor amounts of sphene, calcite, corundum, opaques and zircon. Biotite occurs as clusters which can easily be observed in the specimen. Modal analysis for the rock is not attempted because of its highly coarse-grained nature.

The rock exhibits hypidiomorphic granular texture under the microscope. Plagioclase, which is the dominant mineral, occasionally occurs as phenocrysts and shows feeble twinning; it rarely exhibits vermicular intergrowth with nepheline, carries inclusions of biotite and sphene, and shows peripheral granulation. The rock is characterized by the total absence of K-feldspar and can be termed as foid-diorite[12]. Subhedral to euhedral nepheline is traversed by microfissures containing sodalite and tourmaline which are otherwise absent in the rock; the mineral also carries inclusions of biotite and corundum. Sphene rarely shows lamellar twinning and is partially altered to leucoxene.

Megascopically the nepheline-bearing pegmatite can be distinguished from the nepheline syenite dyke by its inequigranular (and highly coarse-grained) nature with sodalite occurring along the small cracks. Mineralogically, the pegmatite differs from the dyke by the total absence of K-feldspar and spinel, presence of cancrinite, sphene, sodalite and tourmaline; corundum, which occurs as discrete elongated grains with lamellar parting in the dyke, is confined to small inclusions within the nepheline crystals of the pegmatite.

Considering the presence of gabbroic xenoliths in the nepheline syenite plutons of Uppalapadu[7] and Purimetla[6], it was earlier inferred that the gabbros are older to nepheline syenites. The presently reported occurrence of nepheline syenites as dyke and pegmatite in the gabbros of Pasupugallu pluton affords supporting field evidence for assigning an older age to the gabbros and younger age to the nepheline syenites.

One of the authors (YJR) is thankful to CSIR, New Delhi for the award of a fellowship.

15 June 1985; Revised 21 August 1986

1. Narasinga Rao, K. and Leelanandam, C., *J. Indian Acad. Geosci.*, 1974, **17,** 53.
2. Leelanandam, C., Narasinga Rao, K., Mallikharjuna Rao, J. and Madhavan, V., *Curr. Sci.*, 1972, **41,** 39.
3. Madhavan, V. and Leelanandam, C., *J. Geol. Soc. India*, 1978, **19,** 523.
4. Srinivasan, T. P., *Geoviews*, 1981, **9,** 379.
5. Srinivasan, T. P. and Ratnakar, J., *Curr. Sci.*, 1982, **51,** 354.
6. Leelanandam, C. and Ratnakar, J., *Q. J. Geol. Min. Met. Soc. India*, 1983, **55,** 14.
7. Leelanandam, C. and Krishna Reddy, K., *J. Geol. Soc. India*, 1981, **22,** 39.
8. Murty, M. S., *J. Geol. Soc. India*, 1977, **18,** 297.
9. Leelanandam, C., *Curr. Sci.*, 1980, **49,** 550.
10. Leelanandam, C., *Curr. Sci.*, 1981, **50,** 799.
11. Prasad Rao, A. D., Rao, K. N. and Murthy, Y. G. K., *Archaean Geochem. (Abst.)*, 1977, p. 95.
12. Streckeisen, A., *Earth Sci. Rev.*, 1976, **12,** 1.

THERMOELECTRIC POWER OF THALLIUM UP TO 6 GPa

GEETHA RAMANI* and A. K. SINGH
Materials Science Division, National Aeronautical Laboratory, Bangalore 560 017, India.
** Present address: Regional Research Laboratory, Trivandrum 695 019, India.*

THALLIUM has a hexagonal close-packed (hcp) structure at room temperature and pressure, and transforms to a face-centred cubic (fcc) structure at 3.67 GPa. The hcp→fcc transition in thallium is accompanied by a small decrease in volume (0.7%) but a large decrease (15%) in the electrical resistance. The details of the temperature-pressure phase diagram of thallium can be found in a review by Klement and Jayaraman[1]. In this note the thermoelectric power (TEP) of thallium up to 6 GPa has been reported.

The thallium samples used for the present measurements were 99.999% pure from Research Organic/Inorganic Chem. Corp. USA. A tungsten carbide opposed anvil set-up with pyrophyllite gasket and epoxy as the pressure transmitting medium is used to pressurize the specimen. The details of the high pressure cell used for the measurement of TEP have been described elsewhere[2]. Briefly, a flat specimen measuring $0.5 \times 0.05 \times 5$ mm is placed in the gasket assembly. A temperature gradient is set up along the length (5 mm) of the specimen by heating one end with the help of a flattened resistance wire carrying current. The temperature difference between two points on the specimen about 2 mm apart is measured using two pairs of chromel-alumel thermocouples. The thermo e.m.f. generated at these points is also measured with a Leeds-Northrup nanovolt potentiometer (model K-5) using the thermocouple wires as the leads. The standard deviation in the measurement of TEP is 0.3 μVK^{-1}.

The variation of TEP of thallium as a function of pressure is shown in figure 1. The average value of

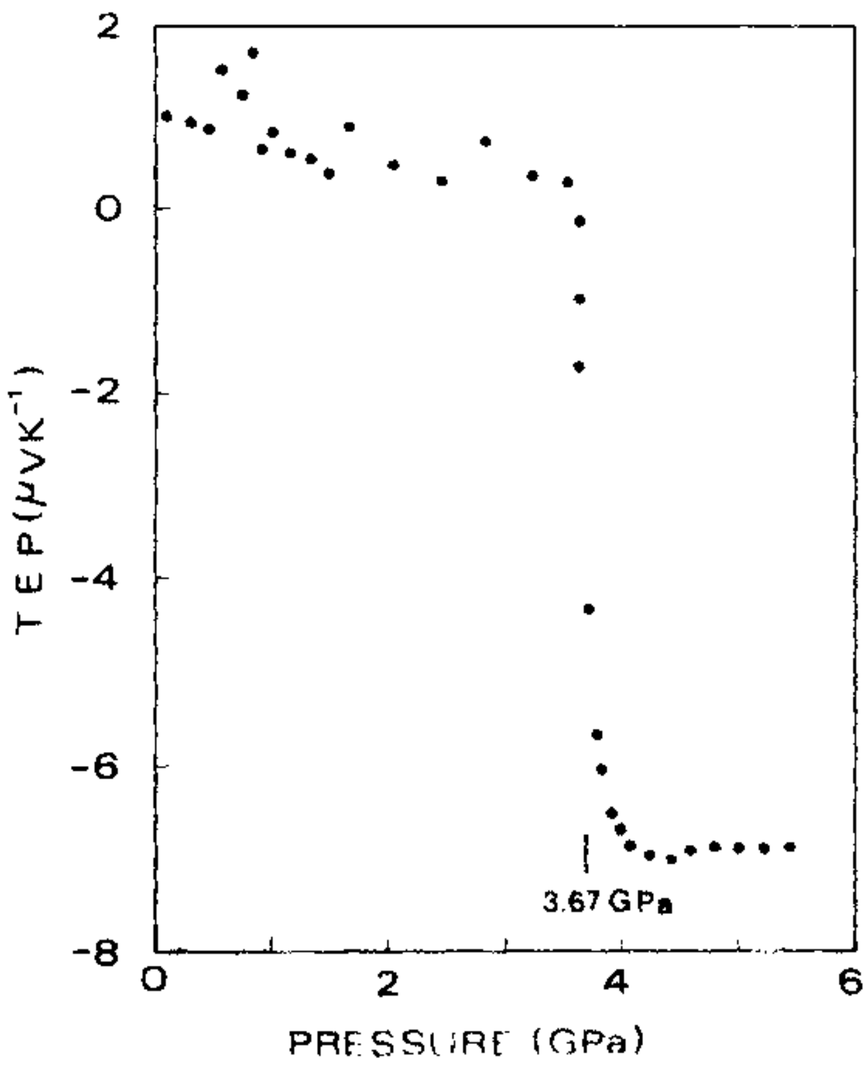

Figure 1. Thermoelectric power of thallium as a function of pressure at 300 K.

TEP at room temperature and pressure as obtained from the present measurement is 1.7 μVK^{-1}. This value is in good agreement with the value of 1.6 μVK^{-1} reported in literature[3]. With increase in pressure, TEP decreases, reaches a value of about 0.6 μVK^{-1} just before the hcp→fcc transition, and drops to -7 μVK^{-1} on completion of the transition.