

TABLE I

Analysis of standard alloy samples

Sample	Di-imine dioxime	1, 10-phenanthroline
NBS 167		
% of Fe certified	2.10%	2.09%
(Co 43%, Ni 21%, Cr 20%, Mn 1.6%, Mo 3.9%, W 4.5%, Nb 3.1%, Ta 0.1%, Si 0.4%, Cu 0.03%)		
NBS 168		
% of Fe certified	3.40%	3.39%
(Co 41%, Ni 20%, Cr 20%, Mo 4%, W 4%, Nb 3%, Ta 1.6%, Si 0.8%, Cu 0.04%)		

TABLE II

Comparison of the di-imine dioximes with standard reagents

Reagents	Sandell's sensitivity $\mu\text{g Fe/cm}^2$
1. EDTA-H ₂ O ₂	0.13 (450 nm)
2. Salicyaldoxime	0.11 (480 nm)
3. Salicylic acid	0.03 (520 nm)
4. Ferron	0.015 (610 nm)
5. Mercaptoacetic acid	0.014 (540 nm)
6. Nitroso-R salt	0.007 (620 nm)
	0.0023 (720 nm)
7. Thiocyanate	0.008 (480 nm)
8. 1, 10-Phenanthroline	0.005 (508 nm)
9. 2, 2',-Bipyridyl	0.007 (522 nm)
10. Bisbiacetylmonoxime- <i>o</i> -phenylene-di-imine*	0.0054 (420 nm)
11. Bisbiacetylmonoxime-ethylene-di-imine*	0.006 (420 nm)

(* Proposed reagents).

Analytical Applications

These reagents are suitable for the determination of iron in alloys and biological materials. Analysis was carried out on National Bureau of Standards No. 167 and 168 samples. The interfering ions together with nickel can easily be removed by the use of an ion exchange resin (Dowex 1 x 8, Cl⁻ form). The technique developed by Kraus⁸ for the separation of first transition metal ions via the interaction of the chloro complexes with an anionic resin proved to be particularly applicable to the present problem. The analysis of these two samples has also been performed by 1, 10-phenanthroline method⁹ (Table I).

Comparison with other methods

The proposed method is compared with standard reagents and the results are given in Table II. Bisbiacetylmonoxime-ethylene/*o*-phenylene/di-imine are as sensitive as *o*-phenanthroline and bipyridyl.

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OCCURRENCE OF UPPER CRETACEOUS-
EARLY TERTIARY BASALTIC ROCKS IN AN
OFFSHORE WELL, GULF OF MANNAR

RAJAHMUNDRI Trap in the Godavari Basin is the southernmost reported occurrence of basaltic rocks equivalent to the Deccan Trap, associated with the east coast sedimentary basins of India. An off-shore well in the Gulf of Mannar drilled recently has encoun-

tered basalts and dolerites of Deccan Trap affinity. This new find is significant in understanding the southward extension of the late Mesozoic-early Tertiary igneous activity in Peninsular India. This note gives for the first time a summary of petrography and mode of occurrence of these basaltic rocks.

The 3,778 m deep wildcat well Mannar 1-1A (9° 6' 31.8" N, 79° 5' 46.3" E) drilled by M/s. Asamera (India) Limited in 1977 is located at about 35 km SW of Rameswaram in the northern Gulf of Mannar. The Cretaceous section with top at 2,660 m is divisible into (a) 2,660-2,750 m—mostly sands, (b) 2,750-3,254 m shale, with sands towards bottom and igneous rocks between 2,761 m and 2,787 m and (c) 3,254-3,778 m igneous rocks with four layers of sedimentary rocks.

The igneous rocks in the interval 2,761-2,787 m occur as two or three layers separated by calcareous sandstones and consist of bulbous masses of subophitic-interstitial basalt and glass with microlites of plagioclase. Glass-rimmed and calcite filled amygdules are common. The bulbous masses are set in a matrix of tuffaceous and glassy material with clastic quartz, feldspar, biotite and chert. The boundary between the bulbous bodies and the matrix is mostly indistinct and transitional. The basalt is inferred to be a pillow lava erupted under submarine conditions. The shales enclosing the basalt layers are dated on microfaunal evidence as early Maestrichtian.

The thickest igneous rocks occur below 3,254 m in five intervals: 3,254-3,314 m, 3,321-3,331 m, 3,344-3,614 m, 3,630-3,644 m and 3,686-3,778 m. These are separated by sedimentary rock composed of black, brittle, shales with arkoses deposited in marine inner sublittoral environments. The igneous rocks in all the layers are characterised by holocrystalline, medium grained (1-5 mm) ophitic-subophitic dolerite, essentially composed of subequal proportions of augite including occasional pigeonite and plagioclase (An 50-60). The common accessories are orthopyroxene and iron ore. Olivine has been noticed occasionally in the 3,550-3,614 m interval. The dolerite is altered in various degrees, particularly at the topmost part. Based on planktonic foraminifera, the sediments in the 3,651-3,677 m interval and above 3,254 m are dated respectively as Cenomanian and Santonian (unpublished report of IPE, ONGC, 1977). Radiometric dating by K-Ar method done on a sample of core from 3,303-3,313.5 m gives an age of 62.3 ± 1.3 my (Danian) indicating the intrusive origin of the rocks.

Chemical analysis for major elements of one sample each from the cores at 2,779-2,785 m, 3,303-3,313.5 m and cuttings from 3,770-3,775 m indicates that the rocks are tholeiites of different kinds comparable to Deccan Trap basalts.

From geophysical surveys (Shenai *et al.*, 1978, unpublished ONGC report) these rocks do not seem to be laterally extensive. There is no appreciable increase in geothermal gradient while approaching or within the dolerite sequence. These suggest that the total volume of magma is limited. It is inferred that these rocks are emplaced as dykes with thin offshoots, apophyses and minor sills. Except in their immediate vicinity, these rocks may not have any effect on the maturation or destruction of organic source material for hydrocarbon generation.

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A NOTE ON THE PALAEOGEOGRAPHY OF HIMALAYA DURING EOCENE

THE rocks of the Subathu Group outcrop in the different parts of the Lesser Himalaya right from Punch (Jammu and Kashmir) in India to Dhading in Nepal. The other outcrops of the Eocene strata have been reported from Zaskar area of Ladakh, Markha valley and Singhe La in the Spiti region. The Early Eocene-early Middle Eocene rocks of the Zaskar, Singhe La and the Lesser Himalaya are lithologically more or less similar to each other.

The black foeted limestone of Singhe La area yielding "*Nummulites ramondi*" and *Nummalitos* spp. "*Nummulites ramondi*" and *Assilina exponens* has been reported from the Markha valley (Pascoe¹). Soodan (personal communication) recorded a rich assemblage of foraminiferids comprising of *Bolivina* sp., *Fasciolites oblonga*, *Fasciolites* sp., *Nummulites atacicus*, *N. mamilla*, *N. (Assilina) deviesi*, *N. (A.) granulosa* var. *Chhumbiensis*, *N. (A.) laminosa*, *N. (A.) sublamina*, *N. (A.) dandetica*, and *Lockhartia hunti* from the dark grey fossiliferous limestones exposed in Kanji nala and Kong nala (Zaskar area) and suggested an Early Eocene-early Middle Eocene age. Tewari² recorded *Nummulites atacicus*, *N. cf. mamilla*, *Assilina dandetica*, and *A. spinosa* from the rocks of the Subathu Group of Dharmasala area and assigned an Early Eocene age. Singh³, Pant and Iqbaluddin⁴, Datta *et al.*⁵⁻⁷, Mathur⁸ and Soodan⁹ recorded a very rich assemblage of the larger foraminiferids from the different strata of the Subathu Group exposed between Bilaspur and Dadahu regions. The larger foraminiferid assemblage includes *Dictyoconoides cooki*, *D. flemengi*, *D. vredenburghi*, *Dictyokathina dadahuensis*, *Lockhartia conditi*, *L. hunti*, *L. hunti* var. *pustulosa*, *L. haimei*, *L. tipperi*, *Nummulites atacicus*, *N. beaumonti*, *N. cf. barboni*, *N. discorbinus*, *N. cf. kelatensis*, *N. cf. planulatus*, *N. lahirii*, *N. mamilla*, *N. obtusus*, *N. stamineus*, *N. striata*, *N. wadiyai*, *Assilina*