SHORT SCIENTIFIC NOTES

Solvent Extraction-*cum*-Atomic Absorption Spectrophotometric Determination of Traces of Gold in Rocks, Minerals and Ores

Determination of traces of gold by the fire-assay technique is tedious and time consuming while colorimetric methods described in literature require the removal of interfering elements. The USGS method[1,2] for determination of gold by Atomic Absorption Spectrophotometry coupled with co-precipitation of gold with tellurium suggested by Hildon and Sully[3] appears to be quite suitable. This method has been further improved by extracting the gold carrying tellurium into an organic phase instead of resorting to filtration.

The method described below is more rapid and enables an analyst to handle more samples every day.

Procedure.—2–5 g of the sample weighed into a 250 ml Pyrex beaker was digested on a hot plate with 10–20 ml of aqua regia and evaporated to dryness. Nitric acid was removed by again evaporating to dryness with 10 ml concentrated hydrochloric acid. The dried mass was extracted with 2 N hydrochloric acid and filtered to remove silica. To the filtrate after boiling was added 1–1·5 mg of tellurium (as potassium tellurite) followed by 10% stannous chloride solution. Heating was continued to facilitate coagulation of the tellurium precipitate (make sure that precipitation of tellurium is complete by testing the supernatant liquid with a few drops of stannous chloride). The contents of the beaker after cooling were transferred to a 250 ml separating funnel and extracted by shaking with 3–5 ml of toluene for a minute or two. The aqueous layer was discarded and the organic phase after washing with 10 ml of 1 N hydrochloric acid, was treated with 1 ml 1 M hydrobromic acid and 2 drops of 1% potassium bromate solution. Gold passes into aqueous phase as auric bromide and free bromine remains in the toluene layer. The absorbance of auric bromide was measured by aspirating the same into an air-acetylene flame of Techtron Model AA 100 Atomic Absorption Spectrophotometer under conditions given below:

Wavelength	242·3 *nm*
Acetylene delivery pressure	5 psi
Flow meter setting	3·0
Air pressure	20 *psi*
Lamp current	4 mA
Slit	0·10 mm

Gold values of a few samples estimated by the USGS method and the proposed method bear good agreement as can be seen from the data given below.

Sl. No.	Gold (ppm.)	
	USGS Method	Proposed Method
1	0·40	0·45
2	0·50	0·60
3	0·80	0·67
4	1·40	1·25

Airborne Mineral Surveys and Exploration,
Geological Survey of India,
Central Laboratories,
Faridabad, *April* 12, 1973.

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A Simple Method to Identify a Methyl Group on a Carbon Holding a Hydroxyl Group[1,2]

A tertiary methyl group is generally considered to be on a carbon holding a hydroxyl group if its signal is at about δ 1·3 in its NMR spectrum. But a methyl group on a carbon holding one end of an epoxide will also absorb at about the same place[3]. Such deshielding can also be caused by other electronegative groups or environments.

We have now devised a simple method by which this methyl group can unambiguously be identified. If the NMR spectra of the compound is taken in two solvents, chloroform and pyridine, in chloroform the methyl group signal appears at about δ 1·3 whereas in pyridine it is at about δ 1·46, thus giving a clear downfield shift of about 0·16 ppm. Spectra of 15 compounds as given below fully support this procedure.

The compounds are (1) linalool, (2) 1-methyl-cyclohexanol, (3, 4) 1-methyl-1, 2-*cis*, and 1, 2-*trans* cyclohexanol, (5) methyl, phenyl, benzyl carbinol, (6, 7) 1-methyl-stilbene-1, 2-diol and its 2-acetate, (8, 9, 10) 17-α-methyl-5-androstene-3 β, 17 β-diol, its 3 β-acetate, and 3 β-tosylate, (11) 17 α-methyl-5-androstene-17 β-ol, (12, 13) 3-methylcholestan-3 β and 3 α-ol, (14) 2, 3 α-epoxy-3 β-methylcholestane

and (15) 6 α-methylcholestane-6 β-ol. Of these the epoxy compound (14) and the corresponding hydroxy compounds (12) and (13) have their C_3-methyl signals at the same place in chloroform, but only in the case of the hydroxy compounds is there a downfield shift of about 0·16 ppm in pyridine. Although in compounds (8) to (15) the methyl group concerned is in a rigid cyclic system as the steroids, in compounds (2) to (4) it is in the flexible simple cyclohexane and in (1) and (5) to (7) in open chain compounds. The presence of phenyl groups or other chromophores as acetate groups does not affect the shift is shown by compounds (5) to (11).

Such downfield shift in pyridine solution is in agreement with similar shifts observed before for methyl groups having a nearby hydroxyl group[4].

National Chemical Laboratory, Poona-8, *March* 22, 1973.

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Utilization of Bromo-Benzene as a Sole Source of Carbon by *Bacillus polymyxa*

Aromatic compounds, present in the soil, represent an important group of substances subjected to attack by the microflora and subsequently utilized as a sole source of carbon. Many numbers of the soil micro-organisms destroy aromatic compounds and their derivatives *via* several pathways[1-4]. Among such micro-organisms, bacteria are the dominant microbial groups, concerned in the decomposition and utilization of such compounds, *e.g.*, species of *Pseudomonas*, *Achromobacter*, *Bacillus*, *Nocardia*, *Streptomyces*, and *Mycobacterium*[1]. However, there is no report regarding the utilization of bromo-benzene as a sole source of carbon by *B. polymyxa*, which is described in the present note.

The bacterium, *B. polymyxa*, was isolated and identified from the sample of sewage of the Post-graduate Chemistry Laboratory of the Saurashtra University, Bhavnagar, by poured plate method, using the usual minerals solution containing 0·5% w/v bromo-benzene as a sole source of carbon and NH_4NO_3 as the nitrogen source, which yielded pure, non-pigmented, thin, spreading, lobate translucent and fimbriate colonies after an incubation period of 72 hr at room temperature (28° C). The culture yielded the same type of colonies on the nutrient agar.

The medium used contained 0·5 ml bromo-benzene, 0·1 g yeast extract, 0·15 g KH_2PO_4, 0·35 g K_2HPO_4, 0·1 g NH_4NO_3, 0·05 g $MgSO_4.7H_2O$, 0·001 g $ZnSO_4.7H_2O$, 0·001 g $FeSO_4.7H_2O$, 0·001 g $CaCl_2.2H_2O$, 100 ml distilled water and 3 g agar powder. The medium was first prepared without bromo-benzene and autoclaved at 121° C for 15 min. It was cooled to 50° C and bromo-benzene added to it.

The morphological and biochemical characteristics of the bacterium showed it to be *B. polymyxa*.

This is a new case showing the utilization of bromo-benzene as a sole source of carbon by *B. polymyxa*. However, the mode of utilization of the ring compound has not yet been determined.

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Gnaphalium purpureum Linn. (Compositae)—A New Record for South India

Gnaphalium purpureum Linn., so far not known in South India, has been collected from the tea fields of Devarshola Estate, Nilgiris (Tamil Nadu) and UPASI Tea Research Station, Cinchona P.O., (Tamil Nadu), while studying the weed flora of the South Indian tea fields.

Gnaphalium purpureum Linn. Sp. Pl. 854, 1753; Clarke in *Hook. f. Fl. Brit. India* 3 : 289, 1881; Maheshwari, *Illustr. Fl. Delhi*, *f* 104, 1966; Santapau in *Rec. bot. Surv. India* 16 (1) : 131, 1967 (rev. ed. 3).

This species resembles the other two common species of the genus, *G. indicum* Linn. and *G. luteo-album* Linn. However, *G. purpureum* could be distinguished in the field from the former by its larger size in general, attaining a height up to 40 cm or more, with leaves reaching up to 8 cm, while in *G. indicum* the plants are diminutive, rarely more than 20 cm tall with leaves most commonly only up to 3 cm long. Floral heads of the

present species are characteristically in globose clusters in the axils of the upper leaves, while they are in leafy spikes in *G. indicum* and ".... in dense leafless, more or less spherical clusters...." (Santapau, *l.c.*) in *G. luteo-album*. *G. purpureum* is further characterised by its pappus hairs, which are coherent at base in a ring.

Specimens examined : *H. Subramanian* 9 deposited in the UPASI Herbarium, Cinchona, Coimbatore District, (Tamil Nadu).

Distribution : Native of Central America, believed to be introduced to India along with American cotton seed and naturalised in various parts of India (Maheshwari, *l.c.*) like Delhi, Upper Gangetic Plain, U.P., N. Bengal, Bihar, Garo hills, Orissa and Maharashtra, Khandala (Santapau, *l.c.*). This plant was later reported from Howrah, W. Bengal also (Sharma S. Vuppuluri, *MS*).

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A Nuclear Polyhedrosis of the Rice Swarming Caterpillar, *Spodoptera mauritia* (Boisduval) (Lepidoptera : Noctuidae)

The rice swarming caterpillar, *S. mauritia* is a serious pest of rice in India and many other parts of the world. The caterpillars feed on rice seedlings both in the nursery and field causing very heavy damages. A nuclear polyhedrosis of this insect was first reported from Hawaii by Bianchi[1] and was later described by Tanada[2]. No report is available on the occurrence of this disease outside Hawaii. During February 1973, widespread mortality of the larvae was observed in the *punja* rice crop at Vellayani. A nuclear-polyhedrosis virus was isolated from these larvae and its pathogenicity proved subsequently.

The cuticle of the infected larvae took on an oily appearance in the initial stages, turning pink in colour as the disease advanced. The colour change was more pronounced on the lateral and ventral aspects of the body. At this stage the larvae were somewhat swollen and limp and sluggish in movement. Death occurred in 3 to 7 days. The cuticle was very fragile and the internal tissues had disintegrated to a semifluid mass by this time. The dead larvae were found either hanging head downwards with their posterior prolegs attached to the foliage or lying over the leaves. The cadavers turned black in a short time.

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Occurrence of *Xyleborus fornicatus* Eichhoff (Coleoptera : Scolytidae) on *Litchi* (*Litchi chinensis* Sonn.) in India

The shot-hole borer, *Xyleborus fornicatus* Eichh., is a serious pest of tea and cacao in Ceylon. Fletcher (1914)[2] reported that in India tea, annato (*Bixa orellana*), Grevillea, *Albizzia stipulata*, *A. moluccana*, cacao, guava, cinchona, *Erythrina indica*, and castor are its host plants. Other recorded host plants in India are *Shorea robusta*, *Ixora parviflora*, *Odina wodier*, *Albizzia odaritissima*, *Gmelina arborea*[1] and *Crotalaria*[3].

During December 1970, the shot-hole borer was noticed attacking *Litchi* plants at the Horticultural Research Station, Chettalli, Mysore State. The beetles attacked branches of 3 to 4 cm diameter by making numerous tunnels of 1·0 to 1·2 mm diameter. On splitting the attacked branches, horizontal circular galleries dislocating the vascular bundles, along with larvae, were found in the wood. The infected branches gradually withered and dried, often breaking at the points where the larval galleries were located.

X. fornicatus has not so far been recorded on *Litchi*.

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