

(4) implies that, When ω_1 is constant, the vector $a_2 - a_1$ is perpendicular to both ω_2 and $V_1 + V_2$; Mr. Singh's letter might make a reader think that $a_2 - a_1$ is perpendicular to $V_1 + V_2$ only.

As a_1 and a_2 are the accelerations of P relative to the coinitial frames F_1 and F_2 respectively, the vector difference $a_2 - a_1$ has no kinematical significance for either P or F_1 or F_2 . The vector representing the difference of the accelerations of a moving point relative to two frames is the acceleration of the origin of one frame relative to the origin of the other only when the orientations of the frames remain relatively unchanged with respect to t and when the origins move relative to each other. If the origins as well as the orientations of two frames remain fixed relative to each other

with respect to t , the { velocity } of a point relative to any one frame would be equal to the { velocity } of the point relative to the other frame, and the vector difference between the { accelerations } of the point relative to the two frames would just vanish.

Hence, it is to be feared that Mr. Singh's description of $a_2 - a_1$ as "relative acceleration" is unjustified and kinematically unsound, and that his interesting result that $a_2 - a_1$ is perpendicular to $V_1 + V_2$ is of algebraic interest only.

C. E. PENDSE.

Poona,
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1. Singh, *Curr. Sci.*, 1947, 16, 45. 2. The cross, 'x', denotes the Vector Product.

ANALYSIS OF GRAPHITE

ALTHOUGH graphite is a mineral of considerable industrial importance, literature on its chemical analysis is meagre. The most widely used methods for determining carbon contents of graphite samples are the following:—

- (i) Dry combustion method in which the weighed sample is mixed with an excess of copper oxide, heated in oxygen and the carbon dioxide evolved adsorbed and weighed;
- (ii) Wet combustion method in which oxidation is brought about by means of a mixture of chromic and sulphuric or phosphoric acids; and
- (iii) Berthier's method in which the weighed sample is mixed with an excess of litharge (total weight known) and the loss in weight on ignition noted.

The first method gives accurate results and the second generally gives lower results but both are slow and tedious. The third method is best suited for rapid routine work.

In the course of our investigations on the concentration of South Indian Graphites¹ the need for a rapid method of analysis which leaves the gangue unaffected was keenly felt. For the determination of the fixed carbon in graphite and pencil composition, Mitchell² suggested strong ignition in a covered platinum

dish over a Bunsen flame until constant weight was reached. Our own experiments, however, showed that while oxidation by ignition in air was more rapid in a platinum than in a silica dish, constant weight was not reached after several hours of continuous ignition. This is not surprising as graphite is practically non-combustible below 650° C.³ and at higher temperatures oxidation in air is very slow. Mellor⁴ records that Donath and Lang had ignited graphite in a capacious Rose's crucible in an atmosphere of oxygen. Using the principle of Donath and Lang's method, the authors have carried out some analysis on South Indian graphites.

The samples of graphite for analysis were tested for carbonate and sulphide minerals. Those contaminated by carbonate and sulphide minerals were not used for this study on account of the possible sources of error that they might introduce. Complete oxidation of the carbon could be secured in thirty minutes using a platinum crucible covered with a perforated lid through which a current of dry oxygen could be maintained. The mineral matter associated with the graphite is left behind in the crucible as residue. Results of analyses by the ignition and the wet oxidation methods are given in the following table. In all cases the graphite samples were first heated to constant weight at 200-210° C.

TABLE
Estimation of Carbon in Graphite by the
Ignition and Wet Oxidation Methods

Sample of Graphite	Carbon per cent.	
	Ignition method	Wet Oxidation
Godavary ..	46.0	44.3
" ..	44.7	43.1
" ..	35.9	34.6
" ..	34.1	32.4
Koraput ..	34.8	33.1
" ..	33.8	32.7

The ignition method clearly yields in all cases a higher value for carbon than the wet oxidation method. Microscopic examination of the gangue obtained by floating the samples shows that quartz is the main constituent and this is accompanied by a little felspar. The ignition method is simple and saves time, an important factor in flotation experiments.

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Departments of Geology C. KARUNAKARAN,
and Chemical Technology, M. NARASINGA RAO,
Waltair,
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