

made at field strengths of 8,000 oersteds. Fine quartz fibres were used, their torsion constants being determined by separate oscillation experiments.

Iodine crystallizes in the orthorhombic system.⁴ Molecules of I₂ have their axes on the *ac* plane, these axes making angles of $+\phi$ or $-\phi$ with the *a*-axis. The atoms in an iodine molecule are 2.70 Å apart. Between neighbouring molecules, the separation is 3.54 Å in the *ac* plane and 4.35 Å in adjacent planes. Cleavage takes place, therefore, easily along the *ac* plane.

With the cleavage face of an iodine crystal horizontal, it is easy to locate the *a* and *c*-axes. Investigations on five crystals gave the following average values for the principal specific susceptibilities.*

$$\chi_a = -0.354, \chi_b = -0.331 \text{ and } \chi_c = -0.366.$$

Since the iodine molecules lie in the *ac* plane, the specific susceptibility normal to the axis of the molecule becomes χ_b . With this simplifying assumption a calculation of the specific susceptibilities of the iodine molecule parallel and perpendicular to the axis, gives $\chi_{\parallel} = -0.389$ and $\chi_{\perp} = -0.331$. The corresponding gram molecular susceptibilities are 98.74 and 84.03 respectively. The angle ϕ works to 51°. The axes of the iodine molecules in the crystal are thus found to be inclined to the *a*-axis of the crystal at angles of $+51^\circ$ or -51° . The available X-ray data do not appear to be specific on this issue.

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July 10, 1945.

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* The susceptibility values are given in 10^{-6} unit.

'KYANOPHYLITE'—A NEW MINERAL OF THE HYDROUS ALUMINIUM SILICATE GROUP, DERIVED FROM KYANITE, FROM MAVINHALLI, MYSORE

ABOUT a mile and a half W.S.W. of Mavinhalli, in the ground consisting of the composite series of kyanite graphite schists, talc biotite schists, sillimanite quartz schists and other types of granulitic rocks, are found some loose bits and small lumps of an apple-green mineral which looks like some variety of talc or chlorites. It is, however, much harder than any of these minerals, and contains a large percentage of alumina and practically no magnesia at all. On chemical analysis, one of the specimens gave the following percentages:—
SiO₂-45.20; Al₂O₃-41.04; CaO-3.72; MgO-0.0; K₂O-0.73; Na₂O-3.84; Loss on ignition (mostly H₂O)-5.00.

The data show that it is essentially a hydrous aluminium silicate.

In thin sections the mineral forms feather-like aggregates, and shows fairly low refraction (about 1.58 to 1.60) and low birefringence,—the interference tints being low greys and hardly rising above yellow and red of the first order. In its physical and optical properties it does not correspond to any of the known varieties of the group of hydrous

aluminium silicate minerals. The mineral forms a new type possessing its own individual characters, and will be described in detail in the next volume (XLIII) of the *Records of the Mysore Geological Department*.

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May 23, 1945.

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MIXTURES OF TETRYL AND T.N.T.

ACCORDING to Giua,¹ and Taylor and Rinckenbach,² tetryl (trinitrophenylmethylnitramine) and T.N.T. form a compound which melts at 67.6° C. and which contains the tetryl and the T.N.T. in the molecular proportion 1:2 respectively. Their conclusion is based on the presence of a very flat maximum in the melting-point diagram for tetryl/T.N.T. mixtures at a point which corresponds to the above proportions and melting-point. Efremov and Tikhomirova,³ using a similar technique, reported that they could find no evidence for the existence of a compound.

As an alternative method of investigation we have determined the molecular weight of the alleged compound by measuring the depression of the freezing-point produced when it is dissolved in benzene. With three separate samples, prepared by melting the tetryl (m.p. 129.1° C.) and T.N.T. (m.p. 80.3° C.) together, figures of 233, 232 and 233 were obtained taking 51.2° C. as the molecular depression for benzene. These figures are, approximately, what would be expected from a mixture. The compound would have a molecular weight of 741.

In addition, it is possible to separate the tetryl and the T.N.T. by treatment with carbon tetrachloride at 0° C.⁴

Clearly, then, tetryl and T.N.T. in the molecular ratio 1:2 do not behave as a compound in solution at about 0-5° C.

We wish to thank the Director of Armaments for permission to publish this observation.

Inspectorate of Military
Explosives, Kirkee,
May 24, 1945.

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J. VERGHESE.

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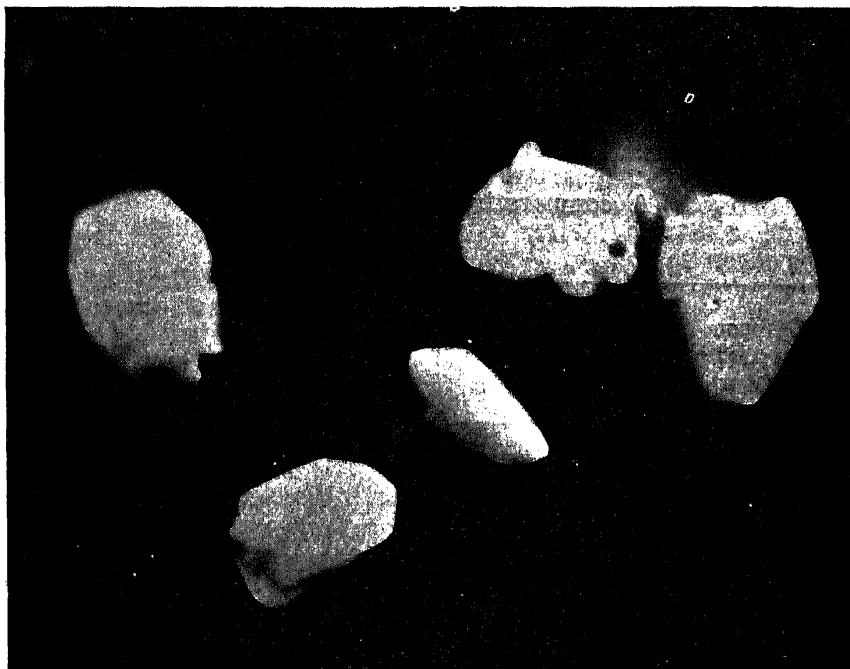
A CHEMICAL METHOD FOR THE ESTIMATION OF ALKALOIDS PRESENT IN ARGEMONE OIL AND ITS APPLICATION TO A MIXTURE OF ARGEMONE AND MUSTARD OILS

ON account of its supposed role in causing epidemic dropsy argemone oil has received considerable attention in recent years. The theory is that when argemone oil is present in mustard oil as adulterant the ingestion of such mustard oil would produce epidemic dropsy in man. Lal *et al.*¹ were not able to substantiate this theory by isolating any toxic substance from this oil. The present authors² have, however, been able to isolate at least two toxic factors of alkaloidal nature from argemone oil. Whether they are responsible

for the development of symptoms of epidemic dropsy in man is a question that can only be settled by further work. The possibility, however, of the presence of toxic substances in edible mustard oil is dangerous from the standpoint of public health and as such attempts should be made to determine as accurately as possible the amount of argemone oil in an adulterated mustard oil sample.

The quantitative nitric acid method proposed by Lal *et al.*³ for this purpose is not reliable

quantity of acetone, ether and saturated ethereal solution of picric acid are added. The flasks containing the mixture are kept aside for about forty-eight hours preferably in a refrigerator. After this, the crystalline picrate precipitate is transferred quantitatively into a weighed sintered glass crucible and then thoroughly washed with petroleum ether and ether (saturated with picrate) to remove oil and excess of picric acid. The crucible is then dried in a steam



Picrate crystals from argemone oil (Magnified)

for various reasons, *e.g.*, (i) the test is not specific—the colour being given by a number of substances, (ii) the supposition that in the case of argemone oil the development of colour is due to a single 'reacting substance' is no longer tenable and (iii) the equivalent amount of 'reacting substance' per c.c. of argemone oil as calculated from extinction coefficient data of Lal varies between 2-3 mgm. and this amount in its turn looks quite small in the light of our experience.

Sarkar⁴ developed a sensitive chemical test for the detection of argemone oil in adulterated mustard oil samples, the criterion of the positive test being the appearance of beautiful orange-red fibrous crystals. This substance has since been purified and has been found to be the hydrochloride of a nitrogenous base—the formula being $C_{10}H_{15}O_4NCl$. As it was soluble in ordinary solvents it was not suitable for quantitative work for which some insoluble or sparingly soluble derivatives of argemone alkaloids were being sought.

The picrate being practically insoluble in petroleum ether and very slightly soluble in ether was considered to be a suitable compound for the purpose. It was also possible to precipitate the picrate in a very good crystalline form (figure) directly from the oil. Conditions were developed to ensure maximum precipitation of picrates and an outline of the method thus developed is given below.

A known amount of argemone oil is taken in small stoppered flasks to which a definite

oven and weighed to constant weight. From this the amount of picrate formed from a known volume of oil can be found out. Taking a particular sample of argemone oil, 1.0 c.c. was equivalent to 10.1, 10.0, 10.1, 10.2 mgms. of picrate. Considering the difficulties associated with the isolation of substances directly from oil no better agreement between the observed values could be expected. Estimations can be carried out accurately with even 0.5 c.c. of argemone oil.

The method with practically the same degree of accuracy is applicable to a mixture of argemone and mustard oils. Good results have been obtained even when the percentage of argemone oil was very low—only 5 per cent. There is a point to be noted in this connection which is that in the case of oil-mixtures, a quantity equivalent to 0.5 c.c. of argemone oil should be taken and reagents added proportionately.

Full details will be presented elsewhere.

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Biochemical Laboratory,
 University of Dacca,
 May 21, 1945.

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