

hydroxyl in the fused benzene ring. The treatment of calycopterin with aluminium chloride has resulted in a new flavone, which exhibits the usual properties of a catechol derivative, *e.g.*, the characteristic red-brown colouration with ammonium molybdate and acetic acid,⁶ and must therefore be 5 : 6 : 4'-trihydroxy-3 : 7 : 8-trimethoxyflavone (VII) or 3 : 5 : 6 : 4'-tetrahydroxy-7 : 8-dimethoxyflavone (VIII); the second alternative needs to be considered since we have noticed that a 3-methoxyl is also susceptible to demethylation by aluminium chloride. The second hydroxyl in calycopterin being in the 6-position, calycopterin may now be formulated as 6 : 4'-dihydroxy-3 : 5 : 7 : 8-tetramethoxyflavone (IX).

H. S. MAHAL.

K. VENKATARAMAN.

Royal Institute of Science, Bombay,
Department of Chemical Technology,
The University, Bombay,
October 19, 1935.

¹ Ratnagiriswaran, Sehra and Venkataraman, *Biochem. J.*, 1934, **28**, 1964.

² Karrer, *Helv. Chim. Acta*, 1934, **17**, 1560.

³ Karrer and Venkataraman, *Nature*, 1935, **135**, 878.

⁴ Compare also Bharadwaj and Venkataraman, *Curr. Sci.*, 1933, **2**, 50.

⁵ Mahal, Rai and Venkataraman. *J. Chem. Soc.*, 1935, p. 866.

⁶ Quastel, *Analyst*, 1931, **56**, 311.

Condensation of ω -Bromoacetophenone with 1-*o*-Aminophenyl-3-Phenylthiocarbamide.

THE condensation of ω -bromoacetophenone with 1-*o*-aminophenyl-3-phenylthiocarbamide yielded a compound (m.p. 230° decomp.; empirical formula $C_{15}H_{13}ON_2SBr$) to which a heptathiodiazine structure was assigned by me.¹ Pathak² has obtained, by carrying out the same condensation, a compound (m.p. 223° decomp.) possessing the same empirical formula and finds that it is the hydrobromide of a weak heterocyclic base. These two compounds have been regarded by him as identical.

That the compound (m.p. 230° decomp.) isolated by me is not the hydrobromide of a heterocyclic base but possesses the heptathiodiazine structure is definitely proved by the fact that it is, as already mentioned in my original paper, acidic in nature being soluble in cold dilute alkali and precipitated by acids. This property, *viz.*, that the compound is unaffected by sodium bicarbonate solution and is precipitated *unchanged* by acid from its solution in alkali, has been

again established and dispels any idea of the compound being a hydrobromide. The compound melts with decomposition to form a dark brown viscous liquid which emits smell of ω -bromoacetophenone.

In view of the properties of my compound as mentioned in my original paper, it is really surprising how Pathak could regard the two compounds as identical, and his conclusion seems not to be well founded. From Pathak's observations, it seems very probable that his compound is entirely different from mine and slight difference in experimental conditions employed by him may account for the formation of a different compound.

My compound (m.p. 230° decomp.) can be prepared as follows: An intimate mixture of the reactants (equimolecular proportions) is mixed, at ordinary temperature, with glacial acetic acid and shaken, when a clear solution is obtained accompanied by rise in temperature. In about an hour a solid is precipitated which after precipitation from an alkaline solution by acid is crystallised twice from glacial acetic acid in colourless needles.

Pathak's further observation by way of comparing the chemical characteristics of both the compounds seems to be desirable.

TEJENDRA NATH GHOSH.

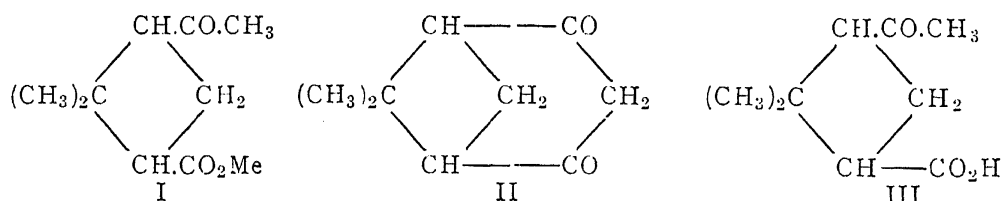
Department of Organic Chemistry,
Indian Institute of Science,
Bangalore,
September 18, 1935.

¹ T. N. Ghosh *J. Indian Chem. Soc.*, 1931, **8**, 71.

² Pathak, *J. Indian Chem. Soc.*, 1935, **12**, 463.

Synthesis of "Ketonopinone" (4 : 6-Diketopinane).

THE synthesis of pinonic acid (III) and its methyl ester (I) starting from *cis*-norpinic anhydride has been reported by us.¹ The conversion of (I) into ketonopinone (II) has now been effected by means of sodium in toluene or sodium methoxide in alcohol solution. Ketonopinone (II), m.p. 104°, purified through its copper derivative (sint 238°) gives a violet coloration with $FeCl_3$, dissolves in sodium bicarbonate, decolourises alkaline permanganate and absorbs bromine in chloroform solution. The constitution was confirmed by hydrolysing it with baryta to pinonic acid (III). Reduction of this diketone to nopinone and nopinane is in progress,



It can now be observed that this constitutes a *total* synthesis of a bicyclic compound in the pinane group; Ruzicka's synthesis of pinocamphone, α - and δ -pinenes² involved the use of pinonic acid yet unsynthesised. Work on the synthesis of pinonic acid starting from norpinic acid is in progress.

Full details will shortly be published elsewhere.

P. C. GUHA.
K. GANAPATHI.

Department of Organic Chemistry,
Indian Institute of Science,
Bangalore,
November 2, 1935.

¹ *Curr. Sci.*, 1935, 3, 484.

² *Helv. Chim. Acta.*, 1920, 3, 756; 1924, 7, 489.

A Manometric Device for Gas Analysis.

FOR the quantitative measurement of the respiratory gaseous exchange in plants Haldane's gas-analysis apparatus is generally used. The apparatus is undoubtedly highly accurate but requires considerable skill before it can be used with discrimination. The construction of the apparatus is complex and an accidental breakage in the glass parts is not easily repaired. In the course of some physiological investigations connected with the Fruit-Preserving and Fruit-Canning industries where a high degree of accuracy is by no means essential, the need was felt for simple and effective means of gas analysis. With this object in view a simple apparatus for gas analysis was constructed in this laboratory and has been in use for some time with satisfactory results. Over the existing forms of the gas-analysis apparatus, it possesses the following advantages: (1) Sampling the gaseous mixture is exceedingly easy. (2) The use of phosphorus¹ as an absorbent for oxygen instead of potassium pyrogallate obviates the necessity of keeping the gaseous sample in a state of continuous agitation which is often very tiring.

The principle of the apparatus (Fig. 1) consists, in brief, in measuring the pressures exercised by the various constituents of a gaseous mixture. As the partial pressure

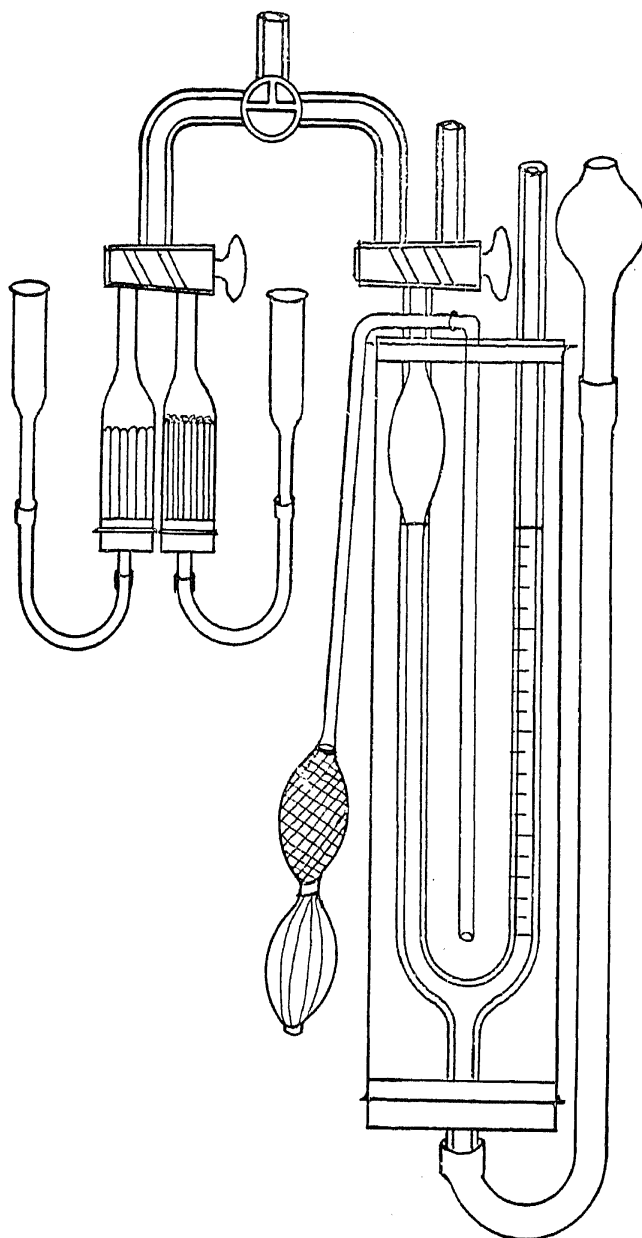


Fig. 1.

A manometric device for gas analysis.

of a component is proportional to its concentration in the gaseous sample and the sum of the various partial pressures is equal to the total pressure exerted by the gas sample, the percentage content of the component, say x , is easily computed:—

$$x = \frac{h \times 100}{H_0}$$

where h = the partial pressure of the component under consideration, and H_0 = atmospheric pressure in mm. Hg.