

effects whether between like or unlike molecules carrying high dipole moments.<sup>1</sup> In some cases, even the formation of a compound does not affect the electronic configuration sufficiently to produce appreciable changes in susceptibility. We need cite only the cases of acetic acid and stannic chloride and of ethyl formate and stannic chloride investigated by Kido.<sup>2</sup> As a natural extension of these investigations, a study was made of the influence of the formation of hydrates on diamagnetism.

Cabrera and Fahlenbrach,<sup>3</sup> using aqueous solutions of potassium iodide observed changes in the magnetic susceptibilities due to different degrees of hydration; they also inferred that there was greater hydration at higher temperatures and that an increase of diamagnetic susceptibility resulted due to greater ionic deformation. In view of the fact that hydrates in general tend to break up on heating, such an influence is quite unlikely. This view has also been recently advanced by Tammann.<sup>4</sup>

Measurements on acetic acid-water mixtures failed to indicate any changes in diamagnetic values at equimolecular concentrations of the components, although a definite compound has been proved to exist particularly by Raman effect<sup>5</sup> and viscosity measurements.<sup>6</sup> As was mentioned in an earlier paper<sup>1</sup> in connection with acetone-chloroform mixtures, the deviation of nearly 12% observed by Sibaiya and Venkataramiah<sup>7</sup> seem to have also been caused by viscosity effects in their experiments.

The decahydrate of sodium sulphate was studied both in the solid state by the Curie method and in concentrated solutions by the Quincke method. When the hydrate was heated to temperatures over 33°C. (at which temperature the water of crystallisation breaks away and the salt becomes anhydrous) no change of magnetic susceptibility was observed.

Aqueous solutions of sulphuric acid, however, indicated definite deviations from additivity at concentrations of the mixture corresponding to  $2\text{H}_2\text{SO}_4, \text{H}_2\text{O}; \text{H}_2\text{SO}_4,$

$\text{H}_2\text{O}; \text{H}_2\text{SO}_4, 3\text{H}_2\text{O}; \text{H}_2\text{SO}_4, 6\text{H}_2\text{O}$  and  $\text{H}_2\text{SO}_4, 18\text{H}_2\text{O}$ . The first hydrate gave an increased value while the others showed negative deviations. The deviations were of the order of 3 to 4%. These hydrates are also indicated by other physical properties such as electrical conductivity, viscosity and surface tension.

The diamagnetic susceptibilities of crystalline sulphates of Li, Na, K and Mg were determined in the solid state by the Curie method. The ionic susceptibilities of  $\text{Li}^+, \text{Na}^+, \text{K}^+$  and  $\text{Mg}^{++}$  calculated from the magnetic values of the hydrated salts, assuming the validity of the additive law, agree satisfactorily with the precision values of Joos,<sup>8</sup> Kido,<sup>9</sup> Ikenmeyer<sup>10</sup> and Pascal.<sup>11</sup> This suggests that the binding of the water molecules to the sulphates is very loose in contradistinction to the case of the hydrates of sulphuric acid. This conclusion receives support from the well-known fact that while sulphuric acid has a great avidity for water, the other sulphates lose their water of crystallisation very easily. Under these circumstances, the results of Ray Chaudhuri<sup>12</sup> seem doubtful.

It may therefore be concluded that there is not much theoretical support from these data for the concept of the enlargement of ionic radii with increased temperature in solution.

Full results will be published elsewhere.

S. RAMACHANDRA RAO.  
P. S. VARADACHARI.

Annamalai University,  
Annamalainagar,  
December 2, 1934.

#### A Preliminary Note on the Chemical Examination of the Roots of *Citrullus colocynthis* Schrader.

*Citrullus colocynthis*, called Indrāyan in Hindustani, is a plant used in medicine for a very long time. The fruit of this plant has been chemically examined by Power and Moore\* in 1910. The roots are described by the Sanskrit writers as a useful cathartic in

<sup>1</sup> *Proc. Ind. Acad. Sc.*, 1934, **1**, 77.

<sup>2</sup> *Sci. Rep. Tohoku Imp. Univ.*, 1932, **21**, 385.

<sup>3</sup> *Zeits. f. Phys.*, 1934, **89**, 166.

<sup>4</sup> *Ibid.*, 1934, **91**, 410.

<sup>5</sup> *Ind. Jour. Phys.*, 1931, **6**, 401.

<sup>6</sup> *Jour. Chem. Soc.*, 1909, **95**, 1556.

<sup>7</sup> *Ind. Jour. Phys.*, 1932, **7**, 393.

<sup>8</sup> *Zeits. f. Phys.*, 1923, **19**, 347.

<sup>9</sup> *Sci. Rep. Tohoku Imp. Univ.*, 1934, **22**, 835.

<sup>10</sup> *Ann. der Phys.*, 1929, **1**, 169.

<sup>11</sup> *Comp. Rend.*, 1921, **173**, 144.

<sup>12</sup> *Zeits. f. Phys.*, 1932, **77**, 271.

\* Power, F. B., and Moore, C. W., *Jour. Chem. Soc.*, 1910, **47**, 99.

jaundice, ascites, enlargement of the abdominal viscera, urinary diseases and rheumatism, etc. They are also supposed to have a drastic purgative action.

2 kilograms of the powdered roots were exhaustively extracted with boiling alcohol. The concentrated extract on standing deposited a white crystalline stuff, which on recrystallisation from alcohol melted at 230° C. The mother liquor was then evaporated to dryness and extracted with petroleum ether. This petroleum ether extract on concentration gave a small amount of a white sediment, which on purification melted at 68° C. From its properties and reactions it was identified as hentriacontane  $C_{31}H_{64}$ .

The resinous mass left after the treatment with petroleum ether, was then extracted with ethyl acetate. The ethyl acetate extract on evaporation of the solvent under reduced pressure yielded a white deposit which was filtered. On recrystallisation from ethyl alcohol it melted at 230° C. From its properties, reactions and elementary analysis it was identified as  $\alpha$ -elaterin. This was the same stuff as that obtained from the alcoholic extract in the beginning. The percentage was 0.2 per cent. of the dried weight of the roots. (Found C=69.0, H=7.5;  $C_{28}H_{38}O_7$  requires C=69.1, H=7.8 per cent.). The diacetyl  $\alpha$ -elaterin  $C_{32}H_{42}O_7$  was prepared in the usual way and crystallised from acetic acid. It melted sharp at 123-124°.

The brown stuff of the dried alcoholic extract, left after the removal of the  $\alpha$ -elaterin by ethyl-acetate was then dissolved in boiling water and treated with basic lead acetate when a yellow precipitate was obtained. It was filtered, washed, suspended in water and decomposed by  $H_2S$ . The resultant filtrate, after the decomposition of the lead salt, on concentration, *in vacuo* gave all the reactions of the saponins. All attempts to isolate this in a pure form have failed upto now.

The physiological properties of the drug appear mainly due to the presence of  $\alpha$ -elaterin. A detailed account of the work will be published elsewhere.

R. R. AGARWAL.  
S. DUTT.

Chemical Laboratory,  
Allahabad University,  
November 19, 1934.

### Mannose Dehydrogenase and Ascorbic Acid (Vitamin C).

WE have for some months been carrying out an investigation on the nature of the precursor and mechanism involved in the synthesis of ascorbic acid by the rat, which is known to be independent of an external supply of the vitamins. It has been found from incubation experiments with the isolated liver, spleen and kidney tissues of the rat at 37° in a medium of Ringer-Locke solution and phosphate buffer at pH 7.4 that these tissues are able to convert mannose but not glucose, fructose, galactose, xylose and arabinose, into ascorbic acid, as determined titrimetrically.<sup>1</sup> Amounts of the order of 0.30—0.35 mg. of ascorbic acid have been formed from mannose per gramme of each of these tissues after 3 hours' incubation. It has been possible, further, to separate to some extent the mannose dehydrogenase system, responsible for the dehydrogenation of mannose into ascorbic acid, by extracting the acetone-dried tissues (liver, spleen and kidney) with water. The cell-free extract from liver is able to produce 0.07 mg. ascorbic acid from mannose per gramme of the tissue under the aforesaid conditions. The tissues, after being washed once with Ringer-Locke solution in order to remove the normal substrates present, are also able to synthesise ascorbic acid from mannose. The apparently specific behaviour of mannose, among the sugars studied, in this respect is under further investigation.

In contradistinction to the rat, the corresponding tissues of the guinea-pig (which is dependent on an outside source of vitamin C), both normal and scorbutic, have been found to be unable to convert mannose (or any of the other sugars mentioned above) into ascorbic acid.

B. C. GUHA.  
A. R. GHOSH.

Biochemical Laboratory,  
Bengal Chemical & Pharmaceutical  
Works, Ltd., Calcutta,  
November 28, 1934.

### Haustorial Regeneration of Sandal (*Santalum album*, Linn) and Its Significance.

THE regenerative ability of plant tissues varies with different species of plants. While some plants can be propagated only through

<sup>1</sup> Guha and Ghosh, *Cur. Sci.*, 1934, 2, 390.