Judging from the foregoing relationships established by this investigation it would seem that dihydroxystearic acid is either a direct or indirect factor in the low productivity in soils: direct by virtue of its harmful effects on growing crops, indirect as an indicator of other compounds or conditions which cause soil to become less productive and even infertil. It is not possible to state from the data at hand that dihydroxystearic acid is the only factor which contributes to the infertility or unproductivity in those soils in which it was found, for it must be remembered that this is only one of many compounds, both organic and inorganic, harmful and beneficial, which exist in soils, any and all of which play a part in its relative fertility and infertility. It is certain, however, that the determination of even this one constituent leads to a recognition of the kind of infertility in the soils examined and is, therefore, a readily recognized symptomatic factor of poor soil conditions.

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NOTES.

Detection of Gas in Sealed Tube Reactions.—Occasionally organic compounds in sealed tube reactions undergo partial decomposition with liberation of gas. While it may be of no importance to determin the amount of gas, it is sometimes desirable to know just what has been formed. The usual method of placing the substance in a Carius or Volhard tube, which is then heated, drawn to a capillary tip nd sealed, does not permit the satisfactory examination of gas. As soon as the capillary tip is heated in a flame, inside pressure causes the gas to escape. Even if there is no inside pressure, which rarely occurs when gas is formed, it is not practical to connect the capillary tube with an absorption tube or eudiometer.

The following method has proved satisfactory in such cases: After the substance, with or without a reagent, has been placed in the Carius or Volhard tube, a specially constructed stopcock of the same glass as the tube is sealed to the end. It requires only the slight skill necessary to join two hard glass tubes. The stopcock is open during sealing and a rubber hose, attached to the stopcock and held in the mouth, permits blowing the glass to uniform thickness at the juncture. The seal is then annealed and the stopcock closed. The tube may be heated to any desired temperature, but at temperatures much above 100°, it is a safe precaution, though not absolutely necessary, to wire the stopcock. When the reaction is completed and the tube is cold, connect the latter with the appropriate apparatus and allow the contained gas to escape gradually. To expel more gas, the tube may be heated. When the experiment is finished, the stopcock is removed and used again. Sometimes a tube breaks but not oftener than the ordinary Carius tube. If

the stopcock is wrapped in a cotton pad, it can often be saved even when the tube breaks. These special stopcocks are not expensive and can be made according to specification by any European dealer in glassware. The style described in this paper was made of so-called "Resistenz" glass and supplied by the firm of C. Desaga, Heidelberg, Germany.

The accompanying sketch and brief description of the dimensions of a stopcock that has proved satisfactory give the necessary details: The stopcocks and tubes, as previously stated, should be of the same glass. Thick-walled Carius tubing is best. The bore of the opening through stopcock *A* is 1.5 mm. in diameter. Stopcock *A* is 2.7 cm. long, its greater diameter at the handle being 1 cm. and its lesser diameter 8 mm. The larger tube *B* should have the same internal diameter as the Carius or Volhard tube to which it is sealed. Its internal diameter is 1.3 cm., wall-thickness 2 mm., and it extends 7 cm. from the stopcock box. The smaller tube *C* is 4 mm. in internal diameter and extends 4 cm. from the stopcock box. The best lubricant for the stopcock is graphite.

As an example of a use of this method in sealed-tube work, the following case may be cited. An organic compound heated for a long time with a volatil reagent slowly gave off acetylene gas. To prove conclusively that such a reaction took place, the experiment was conducted as described above. Upon opening the stopcock and passing the contained gas through ammoniacal cuprous chloride solution, copper acetylide was formed. This reaction would not have taken place in an open tube. In an ordinary sealed tube the recognition of acetylene would have been difficult, if not impossible. The above method settled the question beyond doubt.

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NEW BOOKS.

A Concise History of Chemistry. By T. P. HILDITCH. Pp. ix + 263 (sixteen diagrams). 1911. New York: D. Van Nostrand Co. 5×8 in. Cloth, $1.05.

This volume aims to give a brief outline of the entire history of chemistry from earliest times to the present day. The treatise contains eleven chapters which are devoted to the beginning of the science, inorganic compounds, organic compounds and their reactions, chemistry of plant and animal life, applications of chemistry to manufactures, and physical chemistry. There is an appendix containing a biographical index of chemists and a chronological summary of chemical events of outstanding interest.