The conventional organic combustion methods owe their slowness to the need of placing the sample in a cool furnace, waiting for the furnace to heat, and lastly, after ignition, allowing the furnace to cool for the next sample. Because the organic content of soils is low and the compounds relatively inert and non-explosive, it was possible to devise a method in which the need for cooling the furnace was eliminated. As a result, the time required for a determination was greatly reduced. It seemed probable that with suitable modifications this rapid method could be extended to the determination of carbon in plant materials which are for the most part cellulose compounds. Such modifications would need to include: (1) A means of moving the loaded boat from the cool part of the tube, outside the furnace, to the center of the furnace after all the connections have been made and the oxygen flow started; and (2) an active catalyst in large enough quantity to insure oxidation even under extremely rapid flow of combustible gases. It will become apparent after the description of the apparatus that such changes will also facilitate soil carbon determinations.

APPARATUS

The set-up is shown in Fig. 1. A 36-inch combustion tube is used, either clear quartz or silica with the exposed 11-inch section at the left of clear quartz so that the progress of the oxidation may be observed. A two-unit furnace is necessary. The first unit for igniting the sample is maintained at 950°-1000°C; the second, containing the catalysts, is not heated above 850°C in order that the tube shall not fuse with the copper catalyst and break. Two catalysts are used, cerium oxide and copper, the latter of course becoming copper oxide when the unit is heated the first time. About 2 inches of the tube are occupied by 20-mesh pumice bearing cerium oxide prepared as described by Fisher. This is held in place against the 10-inch section of tightly rolled copper gauze by a short plug of copper gauze.

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