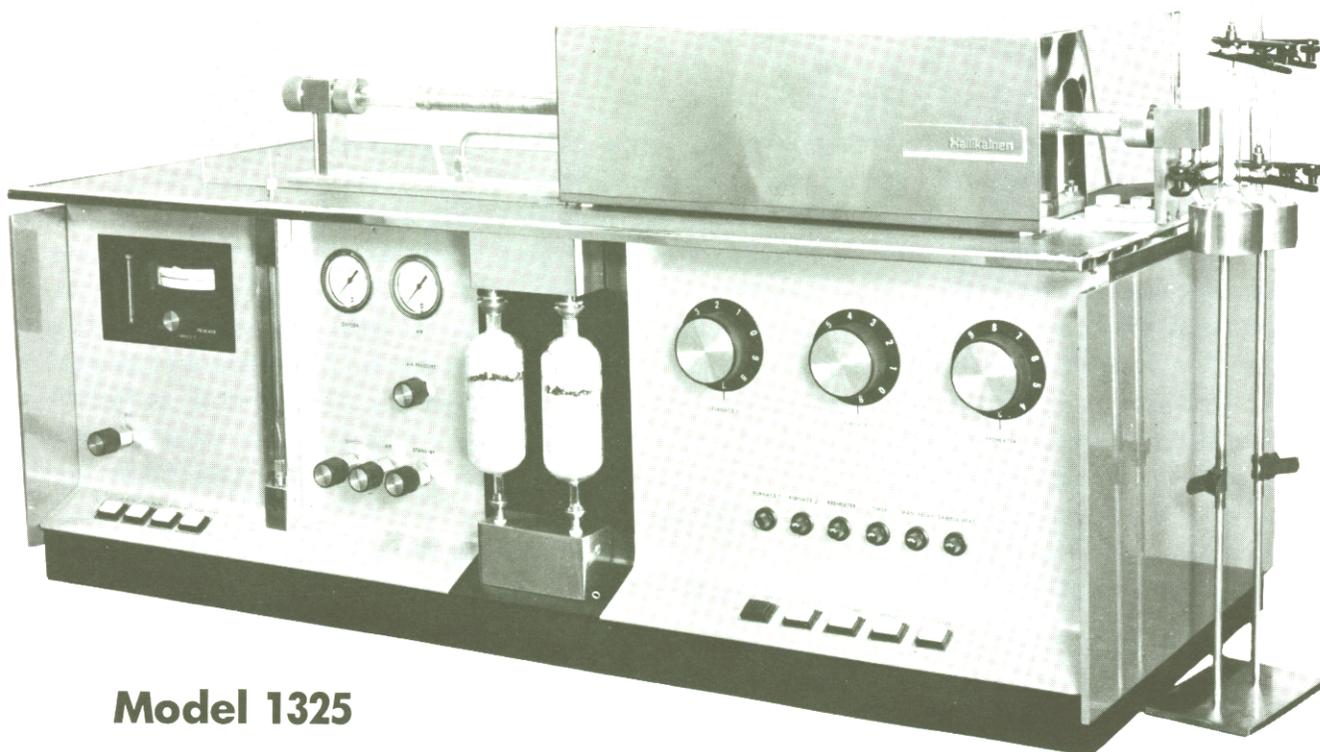


AUTOMATIC MACROCOMBUSTION APPARATUS FOR THE DETERMINATION OF CARBON AND HYDROGEN



Model 1325

This analyzer permits rapid and precise carbon-hydrogen determinations by the classic Leibig procedure with a minimum of operator training and attention. Combustion of the sample is fully automatic, enabling many more analyses to be completed per day than with the manually controlled method. Gaseous products of the combustion are swept into absorbers which are weighed before and after each test. The resulting weight gains indicate the amounts of water and carbon dioxide, enabling simple calculations to be made for carbon-hydrogen content of the sample.

PRINCIPLE OF OPERATION

In this method, a weighed quantity of sample is burned in a stream of air. Before entering the combustion train, the combustion air is passed through a purifying system consisting of a heated tube containing copper oxide and then through tubes containing Ascarite and Dehydrite. This pre-treatment removes carbon dioxide and water vapor from the air and oxygen which are used in the final combustion stage.

The vaporized sample is combusted in the presence of hot copper oxide at 875°C. to insure complete combustion. Halogens and sulfur are removed by special packing materials, silver gauze and lead chromate.

Remaining gaseous products of the combustion—water and carbon dioxide—are swept into the absorption train. Water is absorbed in a specially designed flask containing Dehydrite. A similar flask containing Ascarite absorbs the carbon dioxide.

APPLICATIONS

This analyzer is suitable for the analysis of any material that can be vaporized at a temperature of 100 to 1000°C., such as:

- (1) Hydrocarbons—the complete range of paraffins, aromatics and naphthenes.
- (2) Oxygen containing materials—alcohols, phenols, glycols, ethers, ketones, aldehydes, esters and acids—liquids or solids.
- (3) All materials containing nitrogen, sulfur and the halides.
- (4) Metal-organic compounds.

OPERATION

All operations required for the complete combustion of a sample are carried out automatically and without attention from the operator.

After the sample has been placed in the combustion tube and the absorbers attached to the exit end, the combustion is started by depressing the start button. The sample is alternately heated with a bare wire heater wrapped around the sample section of the combustion tube and cooled with an air blast. Optimum combustion rate is maintained in this manner. The vaporized sample is carried through the combustion train by the carrier gas (air).

The heater and air blast are controlled by a special mercury manometer switch that senses the pressure change in the combustion tube caused by the sample combustion. When the sample has completely vaporized, the sweep gas automatically changes from air to oxygen and the combustion cycle is completed.

The time required for a combustion is 10 to 20 minutes depending on the sample, so, 10 to 20 determinations may be completed in a day.

PRECISION AND ACCURACY

The standard deviation is 0.03% for carbon and 0.02% for hydrogen. Accuracy is of the same magnitude as deviation.

SPECIFICATIONS

Power Requirements:	115 volts, 60 cycle, single phase AC, 1500 watts
Cabinet Dimensions:	37 $\frac{1}{8}$ " x 20" x 20"
Oxygen:	At 5 psig
Air:	At 30 psig
Gas Flow:	Stage 1—250 ml/min. air Stage 2—250 ml/min. oxygen Stage 3—250 ml/min. oxygen Stage 4—25 ml/min. air
Total Analysis Time:	10 to 20 minutes, depending upon sample.
Combustion Tube:	Vycor. When packed in accordance with instructions it is suitable for several hundred samples. Installation is made simple by the special stainless steel end closures (no glassblowing required).
Absorbers:	As used with this analyzer, they hold sufficient absorption medium for 10 to 15 routine determinations and are designed for efficiency and capacity.