inaccuracy. Despite these facts two conclusions seem to be legitimate. They are that there is no great difference in respect to the diffusion constants of the electrophoretically slower and faster moving components of the enzymic hydrolysate and that the diffusion constants of bands *A* and *B* are not inconsistent with those that might be expected for di- and tri-nucleotides. As mixtures containing dinucleotides have been found to be separable by means of paper chromatography (Hummel & Lindberg, 1949) it would seem worth while to test out the suitability of this technique for the further analysis of the fractions obtainable by electrophoresis.

SUMMARY

1. Deoxyribonucleic acid has been hydrolysed by means of the deoxyribonuclease of ox pancreas.
2. The mixture of oligonucleotides thus formed

has been subjected to electrophoresis in agar jelly.

3. The incorporation of a trace of fluorescein in the jelly has made possible the visualization of bands of ultraviolet-absorbing material.

4. After electrophoresis appropriate sections have been cut out of the jelly and the diffusion constants of the materials contained in each has been estimated.

5. The ratios of the purine and pyrimidine bases present in such cuts have been estimated after hydrolysis and separation on an ion-exchange chromatogram.

6. The evidence thus obtained suggests that the main components of the two slowest moving bands are respectively dinucleotide(s) of adenine and cytosine and trinucleotide(s) containing one residue of thymine and two residues of cytosine.

Sincere thanks are due to Mrs Lisa Vestermark for technical assistance.

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Improved Nomograms for Manometer Constants

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(Received 13 October 1950)

Dixon (1945) published a set of nomograms for the rapid determination of the constants of Warburg and Barcroft manometers. They have proved useful in practice and have saved much time and calculation, but could only be used for one, or at the most two, fixed temperatures. For work at other temperatures it was necessary either to construct new nomograms or to determine the constants by calculation.

Burris (1949) later devised a nomogram for Warburg manometers which could be used for any temperature up to 45°, but it was inconveniently complicated and required three separate settings of the straight edge (in addition to the calculation of v_0 from V and v_p) to determine each constant. No such nomogram has been produced for Barcroft (differential) manometers.

Fig. 1. k_{O_2} for Warburg manometers. Stretch a fine black thread across the nomogram so as to connect the given value of V with the point of intersection of the lines for v_F and T , and read off k_{O_2} . Intermediate values can readily be estimated visually. The example indicated shows that a manometer with a 23 ml. vessel containing 3 ml. of liquid has a k_{O_2} of 1.81 at 30° .

Fig. 2. k_{CO_2} for Warburg manometers. To be used in the same way as Fig. 1.

It has now been possible, by making use of the principle of the grid nomogram, to construct nomograms for both Warburg and Barcroft manometers which can be used for any temperature in the usual range, and yet are practically as simple and rapid in

remaining scale (or scales) then moves as the temperature alters, thus forming a grid.

It is assumed that Brodie's solution ($P_0 = 10,000$ mm.) is used in the Warburg manometers and paraffin oil ($P_0 = 13,100$ mm.) in the Barcroft manometers, as

Fig. 3. C for Barcroft manometers. Connect the given value of A , the area of cross section of the manometer tube in sq.mm., with v_g' , the volume of the gas phase in the compensating vessel in ml.

use as those originally published. Figs. 1 and 2 give k_{O_2} and k_{CO_2} respectively for Warburg manometers and Figs. 3–5 give constants for Barcroft manometers.

For constructional purposes they may be each regarded as consisting of a large number of superimposed nomograms for different temperatures, in which the positions and magnifications of two of the scales are arbitrarily fixed at constant values. The

this is the usual practice. These nomograms do not apply to manometers containing heavy liquids, e.g. Clerici solution. The volumes are given for convenience in ml. and not in μ l. It should be noted that V always refers to the total volume of the vessel, as determined by calibration with mercury; the preliminary calculation of v_g is therefore rendered unnecessary.

For Barcroft manometers $k = CD$, C being given by Fig. 3, and D for O_2 by Fig. 4 and for CO_2 by Fig. 5. In

It will be noted that at about 18° k_{CO_2} becomes independent of v_f . This is because at this tem-

Fig. 4. D_{O_2} for Barcroft manometers. Place a straight edge to connect V with A . On this place a 90° set square and slide it along until it passes through the point of intersection of v_f and T on the central grid. D is then read off on the upper grid at the correct level of T . The example shows that a manometer with a 36.03 ml. vessel containing 3 ml. of liquid and a 0.38 sq.mm. tube has a D of 2.385 at 38° . C for this manometer = 1.01 (from Fig. 3) so that $k_{O_2} = 2.41$.

Fig 3 scales are given for vertical as well as for tilted manometers, as it is now becoming common practice to use Barcroft manometers with vertical shakers.

perature 1 ml. of water contains as much CO_2 as 1 ml. of the gas phase at any partial pressure of CO_2 .

Fig. 5. D_{CO_2} for Barcroft manometers. To be used in the same way as Fig. 4.

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