(2) (7) Tuesday 30th Nov

HALDANE BLOOD GAS APPARATUS

This measures the gas evolved from or absorbed by blood and is controlled for changes in temperature and pressure, by control bottle A and by levelling tube I respectively.

Readings are made at room temperature and atmospheric pressure.

The gas evolved is saturated with water vapour.

To determine the oxygen capacity of blood.

Principle

Blood which has been well shaken with air is laked and then treated with $K_3Fe(CN)_6$, in presence of alkali.

Method

1. Put taps J and K in position, i.e. open to air and to tubes F and G.
2. Into bottle A put 5 ml. borate buffer pH 10·0. Into B put 3 ml. of the same solution and then slowly run under it 2 ml. of fully oxygenated blood. Add a pinch of Lissapol. Shake carefully and see that the blood is fully laked.
3. Into the little tube put 0·25 cc. 6% potassium ferricyanide and touch the mouth of the tube with a rod which has been dipped into solid bile salt.
4. Vaseline the stoppers and connect the bottles as shown, B to E and A to G. Place the bottles in bath.
5. Bring level in E to zero mark or near it by altering the level of H. Bring levels in F and G to fixed mark by means of I. Leave for 2 mins. to attain constant temperature. Read level in E, which is a 1 cc. graduated pipette.
6. Turn taps J and K to position, i.e. off from the air but connecting bottles with rest of apparatus. Read level in E and note level in F and G after $\frac{1}{2}$ minute. If the levels have altered, then open taps to air again and repeat (6). BE CERTAIN THAT TAPS ARE IN POSITION (closed to the air) before proceeding.
7. Tip the ferricyanide to mix with contents of bottle, which should be kept in the bath throughout. Shake well but do not get the tube blocked with liquid. As gas comes off the level in E falls and those in F and G also alter; as this happens adjust I and H so that levels in G and F keep at their fixed marks. By this means atmospheric pressure is maintained.
8. Read level in E (i.e. the volume of O_2 evolved) with level in F and G at the fixed marks.
9. Shake bottle again and read E again. Repeat till constant.
10. Read temperature of bath. Read the barometer. Look up tension of aqueous vapour at observed temperature.

Suppose original level in E = ·02
" final " " " = ·40
Then 100 cc. blood held (·40 - ·02) x 100/2 cc. O_2
This volume brought to cc. of dry gas at N.T.P. = O_2 capacity.

From this figure calculate the haemoglobin content of the blood.

The same apparatus is used (a) to determine the oxygen content of blood which is not fully oxygenated, (b) to determine percentagw saturation of blood with oxygen.

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