A Note on the Volumetric Estimation of Hydrogen Peroxide in Presence of Potassium Persulphate.

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Friend (*J. Chem. Soc.*, 1904, 85, 597, 1533; *ibid.*, 1905, 87, 1367) has shown that in ordinary circumstances an accurate estimation of hydrogen peroxide in presence of potassium persulphate by direct titration with potassium permanganate is not possible, because during titration H_2O_2 and $K_2S_2O_8$ react with each other in the sen:e of the equation, $H_2O_2+K_2S_2O_8=K_2SO_4+H_2SO_4+O_2$. Fairly satisfactory results may be obtained by correcting for the H_2O_2 consumed as above during titration.

The total available oxygen in one portion of the mixture is first estimated by the $FeSO_4-KMnO_4$ method (1). The same volume of the solution is then titrated with $KMnO_4$ and the volume of $KMnO_4$ required is noted (2). The amount of persulphate left behind in the liquid from (2) is finally determined by the $FeSO_4-KMnO_4$ method (3).

If the total available oxygen in (1) $\equiv x$ c.c. of standard K Mn O_4,
the permanganate required in (2) $\equiv y$ c.c. ,, ,,
and the residual persulphate in (3) $\equiv z$ c.c. ,, ,,
then the quantity of H_2O_2 which interacted with $K_2S_2O_8$

during titration $\equiv \frac{(x-y-z)}{2}$ c.c.

Hence the amount of H_2O_2 in the solution taken for analysis

$$\equiv y+\frac{(x-y-z)}{2} \text{ c.c.}$$

Example.—20 C.c of a solution of H_2O_2 required 17·55 c.c. of $0{\cdot}1N$-$KMnO_4$. 20 C.c. of the same H_2O_2 were mixed with 20 c.c. of a solution of $K_2S_2O_8$ and the total available oxygen in the mixture was found to be equal to 34·16 c.c. of $KMnO_4$ (x). Another 20 c.c. of H_2O_2were mixed with 20 c.c. of $K_2S_2O_8$ and the mixture titrated with $KMnO_4$ in the usal way. 16·90 C.c. of $KMnO_4$ (y) were required. The amount of $K_2S_2O_8$ in the titrated liquid was then determined and was equivalent to 15·89 c.c. of $KMnO_4$ (z).

The amount of H_2O_2 in the mixture $\equiv 16{\cdot}9 + \frac{(34{\cdot}16 - 16{\cdot}9 - 15{\cdot}89)}{2}$ c.c.

$\equiv 17{\cdot}59$ c.c. of 0·1 N-$KMnO_4$. Theoretical value $\equiv 17{\cdot}55$ c.c.

The results of a few more experiments carried out in the same manner are given in the following table.

Column I gives the weight of $K_2S_2O_8$ in grams in the mixed solution. Column II gives the total available oxygen in the solution in terms of 0·1 N-$KMnO_4$ (x). Column III gives the volume of 0·1 N-$KMnO_4$ required for titrating the H_2O_2 in mixture (y). Column IV gives the residual $K_2S_2O_8$ in the solution after titration with $KMnO_4$, in terms of 0·1 N-$KMnO_4$ (z). Column V gives the value of $y + \frac{(x-y-z)}{2}$. Column VI gives the theoretical value of H_2O_2 in mixture in terms of 0·1 N-$KMnO_4$.

I	II	III	IV	V	VI
$K_2S_2O_8$	x	y	z	$y + \frac{(x-y-z)}{2}$	
0·2136	32·50 c.c.	16·00 c.c.	15·10 c.c.	16·70 c.c.	16·70 c.c.
0·4272	48·30	15·46	30·45	16·66	16·70
0·6408	64·10	15·00	45·80	16·65	16·70
0·6408	64·10	14·90	45·70	16·65	16·70
0·2475	36·85	17·90	17·70	18·53	18·56
0·4950	50·46	12·82	35·60	13·84	13·86

The agreement between the values in columns V and VI is very satisfactory.

A similar method may be employed for estimating hydrogen peroxide in presence of permonosulphuric acid.

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