Four sets of solutions were made up according to the above formula using methyl, ethyl, propyl and benzyl *p*-hydroxy benzoates as stabilizers. No similarity in color could be detected and after standing for a period of 10 months the samples had noticeably darkened in color. p_H determinations were made at two-month intervals.

Table III.—p_H Values, Methyl Para Hydroxy Benzoate as Stabilizer

Sample	Months 0	2	4	6	8	10	Av.
1	5.2	3.6	4.8	5.0	5.0	2.6	4.4
2	5.7	3.6	5.3	5.1	5.0	4.5	4.9
3	5.5	3.5	5.4	5.4	5.1	4.6	4.9
4	5.6	3.1	5.7	5.3	4.9	4.3	4.8
5	6.1	3.4	5.6	5.5	5.0	3.5	4.8
6	5.9	3.3	5.8	5.7	5.3	4.5	5.1
7	6.0	2.8	5.7	5.5	5.1	4.5	4.9
8	6.1	3.8	6.0	6.0	5.4	4.2	5.2
9	6.1	3.3	5.6	5.5	5.2	4.6	5.1
10	6.1	3.4	5.5	5.4	5.0	4.5	5.0
11	5.9	3.3	5.7	5.4	5.0	4.5	5.0
12	5.9	2.8	6.0	5.5	5.3	4.5	5.0

Table IV.—p_H Values, Ethyl Para Hydroxy Benzoate as Stabilizer

Sample	Months 0	2	4	6	8	10	Av.
1	5.3	3.8	6.1	5.7	5.5	4.6	5.3
2	6.1	4.0	5.7	5.6	5.1	4.5	5.2
3	5.9	4.7	6.2	5.6	5.5	4.6	5.4
4	5.9	4.0	5.9	5.4	5.1	2.8	4.8
5	5.8	4.2	5.9	5.5	5.2	4.2	5.1
6	5.5	4.1	6.1	5.6	5.3	4.3	5.1
7	5.6	4.3	6.2	5.5	5.3	2.8	4.9
8	7.9	5.2	6.7	6.3	5.9	4.5	5.9
9	6.3	4.4	6.2	5.7	4.8	3.7	5.2
10	5.9	4.5	5.9	5.5	5.2	4.1	5.2
11	6.0	4.4	6.6	5.4	5.2	4.3	5.3
12	6.2	4.1	6.1	5.9	5.3	4.2	5.3

Table V.—p_H Values, Propyl Para Hydroxy Benzoate as Stabilizer

Sample	Months 0	2	4	6	8	10	Av.
1	6.0	3.0	6.5	5.6	5.2	4.4	5.1
2	6.3	3.2	6.2	5.4	5.2	3.2	4.9
3	6.5	3.8	6.5	5.7	3.9	3.3	4.9
4	6.0	3.5	6.0	5.3	4.9	4.3	5.0
5	6.5	3.7	5.9	5.6	5.1	3.3	5.0
6	6.2	3.8	5.0	5.8	6.0	4.5	5.2
7	6.1	3.9	6.2	5.6	2.9	2.2	4.5
8	6.7	4.7	6.6	6.2	5.3	3.4	5.5
9	6.1	3.9	6.3	5.7	5.1	3.2	5.0
10	6.6	3.8	6.2	5.6	5.0	4.2	5.2
11	6.9	3.9	6.5	5.6	5.0	4.5	4.9
12	6.3	3.6	6.3	5.7	5.3	4.5	4.8

Table VI.—p_H Values, Benzyl Para Hydroxy Benzoate as Stabilizer

Sample	Months 0	2	4	6	8	10	Av.
1	6.3	2.4	6.3	5.7	4.8	3.4	4.8
2	6.2	2.9	5.8	5.7	5.1	4.3	5.0
3	6.5	3.2	6.2	5.7	5.4	4.3	5.2
4	5.9	2.5	5.8	5.0	2.9	2.4	4.1
5	6.1	2.9	6.1	5.6	4.9	4.3	5.0
6	5.7	3.0	6.8	5.7	4.8	4.4	5.1
7	6.7	3.5	6.3	5.8	5.0	4.4	5.3
8	6.5	3.8	6.8	6.3	5.7	4.9	5.7
9	6.4	3.7	6.1	5.4	4.4	2.7	4.8
10	5.6	2.9	6.0	5.7	5.4	4.6	5.0
11	5.9	3.9	5.9	5.7	5.2	4.8	5.2
12	5.6	4.2	6.1	3.9	4.3	3.8	4.6

CONCLUSIONS

1. A study of the rate of change of hydrogen-ion concentration of tannic acid solutions has been made.

2. Ethyl and propyl para hydroxy benzoates exhibited a stronger stabilizing power on tannic acid than the corresponding methyl and benzyl esters.

3. We believe that the recommended stabilizing agents do not produce the desired effect with respect to hydrogen-ion concentration.

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Adaptation of Assay Methods for Some N. F. Ointments. Ointment of Zinc Stearate*

By Wm. B. Baker and D. I. Kutzly

Many ointments in the N. F. VI do not have assay methods given for the determination of their active constituents. In the case of a number of these ointments, it has been found (1) that suitable assay procedures for the quantitative determination of certain medicinal ingredients are possible by adaptation of the assay methods that already exist for certain of the drugs and chemicals contained in the formulas.

OINTMENT OF ZINC STEARATE

The assay method for Zinc Stearate, U. S. P. XI, may be successfully adapted for use in the assay of Ointment of Zinc Stearate, N. F. VI, as shown by the satisfactory results reported in this article.

"Zinc Stearate is a compound of zinc with variable proportions of stearic acid and palmitic acid, corresponding to not less than 13 per cent and not more than 15.5 per cent of ZnO" (2). Therefore, the criterion of

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the assay for purity of Zinc Stearate and the content of Zinc Stearate in Ointment of Zinc Stearate depends upon the zinc oxide content.

EXPERIMENTAL

A sample of Ointment of Zinc Stearate was prepared according to the directions given in the N. F. VI. The Zinc Stearate used in the ointment was examined for purity prior to its incorporation into the ointment sample.

Table I.—Results of Assay of Zinc Stearate (U. S. P. XI Method)

Wt. of Sample, Gm.	$N/10$ H_2SO_4 Added, Cc.	$N/10$ NaOH Required, Cc.	Excess Acid Consumed, Cc.	ZnO, %
1.0051	50.35	17.14+	33.21−	13.44
1.0065	50.35	17.02+	33.33−	13.47
1.0043	50.35	16.91−	33.44+	13.55
1.0028	50.35	17.26−	33.09+	13.43
			Average	13.47

Table II.—Results of Assay of Ointment of Zinc Stearate for Zinc Oxide

Wt. of Sample, Gm.	$N/10$ H_2SO_4 Added, Cc.	$N/10$ NaOH Required, Cc.	Excess Acid Consumed, Cc.	Gm. of ZnO per 100 Gm. Ointment of Zinc Stearate
1.0010	50.35	38.83−	11.52+	4.68
0.9998	50.35	38.48−	11.87+	4.83
1.0053	50.35	38.59+	11.76−	4.76
1.0007	50.35	38.83−	11.52+	4.69
			Average	4.7396

Calculated percentage of zinc oxide in sample (35×13.47) = 4.7145
Average percentage of zinc oxide found in sample = 4.7396
Difference = 0.0251
Percentage error ($0.0251 \div 4.7396$) $\times$ 100 = 0.53

Assay Procedure for Zinc Oxide.—Place about 1 Gm. of the ointment, accurately weighed, in a tared crucible of about 30-cc. capacity. Heat the crucible and contents *gently* over a Bunsen flame until the ointment is liquefied. Gradually increase the temperature and ignite to eliminate the ointment base. Digest the residue remaining in the crucible after ignition with 50 cc. of tenth-normal sulfuric acid until solution is complete. Then titrate the excess of tenth-normal sulfuric acid with tenth-normal sodium hydroxide, using methyl red T.S. as the indicator. Each cc. of tenth-normal sulfuric acid is equivalent to 0.004069 Gm. of ZnO.

DISCUSSION

The base of Ointment of Zinc Stearate is composed of liquid petrolatum and white petrolatum. These ingredients are carbonized (along with the stearic acid and palmitic acid portions of the zinc stearate) upon ignition, leaving a residue of zinc oxide, which is determined titrimetrically.

The procedure for the determination of the active ingredient is simple, and accurate results are obtained.

RECOMMENDATION

It is recommended that the method described above for the determination of zinc stearate in Ointment of Zinc Stearate be adopted for admission to the National Formulary, and that the following standard be prescribed for the Ointment: Ointment of Zinc Stearate contains not less than 4.2 per cent and not more than 5.8 per cent of ZnO.

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Postage stamps have been issued by Italy in honor of the following: Leonardo da Vinci, painter, sculptor, architect and scientist; Alessandro Volta, electrophysicist; Luigi Galvani, physicist and anatomist.