Table I.—Alcoholic Content of Elixirs

	Elixir	Low Elixir	High Elixir	% Alcohol N. F. Monograph	% Alcohol in Extemperaneous Preparations
1.	Almond Comp.	1	(1 Water)	3–5	4.2
2.	Aminopyrine	6	1	17–20	18.7
3.	Arom. Rubrum	4	1	22–24	22.4
4.	Barbital	2	1	29–32	31.0
5.	Calc. Lacto-phos.	6	1	17–20	18.6
6.	I. Q. and S.	4	1	22–24	22.1
7.	Pepsin	12	1	13–15	14.1
8.	Pepsin Comp.	7	1	16–19	17.3
9.	Phenobarb.	6	1	17–20	18.5
10.	Rhei. Alk.	3	2	34–38	35.8
11.	Sod. Brom.	2	(1 Water)	5–7	5.8
12.	Terpin Hyd.	1	1	38–42	42.2
13.	Triple Brom.	1	(1 Water)	3–5	4.35
14.	Vanilla Comp.	5	(1 Water)	7–9	7.6

vantages of this method are that the Iso-Alcoholic Elixirs of the National Formulary suffer no deterioration over long periods of time and may therefore be prepared in quantities of one gallon or more and used as required for the extemporaneous preparations.

No difficulty has been encountered in this laboratory in the preparation of the various Elixirs of the N. F. by this method and in many cases the time required for preparation has been materially decreased.

A 1 per cent solution of Amaranth was substituted for Cudbear in the Iso-Alcoholic Elixirs of Amino-pyrine, Aromatic Rubrum, Pepsin Compound and Phenobarbital. This substitution has given, we believe, a greater brilliancy and is less affected by light exposure and change of p_H.

It has been observed that in the case of Elixir of Phenobarbital, where the prescribed amount of Phenobarbital is in excess of that required for the Official Elixir of Phenobarbital in the N. F., sufficient of the high Iso-Alcoholic Elixir should be used to obtain at least a 30 per cent alcoholic vehicle, this being in accord with the findings of Fantus and Dyniewicz (1, 2).

EXPERIMENTAL

Fourteen elixirs were prepared according to the directions of the National Formulary VI, also fourteen duplicates were prepared using the Iso-Alcoholic Elixirs of the N. F.

The alcoholic content was determined in the samples prepared from the iso-alcoholic elixirs.

Each pair of samples of the duplicate sets of Elixirs was compared as to color, odor and taste and found to be identical. After standing over a period of more than ninety days, no apparent change had occurred.

SUMMARY

(1) The use of the Iso-alcoholic Elixirs of the N. F. permits the pharmacist to prepare the elixirs of the N. F. extemporaneously at a considerable saving of time.

(2) The extemporaneous preparations are strictly comparable with the same elixir of the N. F. as to alcoholic content, color and taste.

(3) Amaranth may be substituted for Cudbear to advantage in some elixirs.

BIBLIOGRAPHY

(1) Fantus and Dyniewicz, "Barbiturate Vehicles," JOUR. A. PH. A., 25 (1936), 993.

(2) Fantus, *et al.*, "A Study of Vehicles for Medicines," *Ibid.*, 22 (1933), 751; 23 (1934), 127.

Particle Size Studies

II. The Grain Size Distribution of Bismuth Subsalicylate U. S. P.*

By John J. Corcoran† and Sister Mary Etheldreda, F.S.S.J.‡

INTRODUCTION

The Pharmacopœia (1) describes Bismuth Subsalicylate as "an amorphous or microcrystalline powder." New and Non-Official Remedies (2) lists as accepted one brand of the drug and ten oil-suspensions of the product. Since for the best development of the action of the drug as well as for its mechanical suspension in oil, a very fine divi-

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Table I.—Grain Size Distribution of Particles as Percentage by Weight Finer than Size in Six Samples of Bismuth Subsalicylate, U. S. P. XI

T (Min.)	*H* (Cm.)	Grain Size (Microns)	Percentage by Weight Finer than Size					
			Mfg. A	Mfg. B	Mfg. C	Mfg. D	Mfg. E (Reg.)	Mfg. E (Spec.)
5	19.7	18.68	78.6	87.8	87.4	83.2	86.4	98.6
15	19.4	10.70	69.4	87.4	84.4	82.6	79.8	98.0
30	19.0	7.48	55.4	77.2	74.8	76.8	12.6	96.0
60	18.7	5.24	54.0	50.6	62.8	63.4	7.0	95.6
120	18.4	3.68	27.6	30.4	52.2	39.2	3.8	92.8
240	18.0	2.57	20.2	18.6	39.4	17.4	3.0	90.4
360	17.7	2.08	15.6	14.6	31.8	11.2	2.6	90.0
1440	17.4	1.02	6.4	4.0	18.2	2.2	1.4	76.2

Table II.—Grain Size of Particles as Percentages by Weight in Distribution Intervals in Six Samples of Bismuth Subsalicylate, U. S. P. XI

Mfg.	$< -1.02\ \mu$	1.02–2.57 μ	2.57–7.48 μ	7.48–18.68 μ	>18.68
A	6.4	13.8	35.2	23.2	21.4
B	4.0	14.6	58.6	10.6	12.2
C	18.2	21.2	35.4	12.6	12.6
D	2.2	15.2	59.4	6.4	16.8
E (Reg.)	1.4	1.6	9.6	73.8	13.6
E (Spec.)	76.2	14.2	5.6	2.6	1.4

sion of the salt is essential, we have determined the grain size distribution in six commercial samples of this drug.

EXPERIMENTAL

The test was conducted by the method described by the authors in a previous communication to this JOURNAL (3). The grain size was calculated from Stoke's law according to the falling velocities of the particles (h/t). When the test is conducted at 25° C. on material with a specific gravity of 3.0 and distilled water used as the suspending medium,

$$r \text{ is equal to } 5.84\sqrt{H/T} \qquad (1)$$

with r, the radius of a spherical particle, in microns; H in cm. and T in minutes. Applying Stoke's law to cubes, the width of a cube is equal to 1.612 r. Thus, the grain size of the particles, calculated as cubes is

$$\text{Grain size is equal to } 9.414\sqrt{H/T} \qquad (2)$$

The results are tabulated in Tables I and II.

SUMMARY

1. The grain size distribution in six samples of Bismuth Subsalicylate, U. S. P. XI has been determined.

2. In five of the six samples tested, 80 per cent of the particles have a grain size less than 20 microns. In one sample (labeled "special" by the manufacturer), 90 per cent of the particles have a grain size less than 3 microns.

CONCLUSIONS

The Pharmacopœia might properly describe Bismuth Subsalicylate as an amorphous or microcrystalline powder in which not less than 80 per cent of the particles have a grain size smaller than 20 microns.

REFERENCES

(1) United States Pharmacopœia XI, Second Supplement, (1939), page 32.

(2) New and Non-Official Remedies, (1940), page 144.

(3) Corcoran, John J., and Etheldreda, Sister Mary, JOUR. A. PH. A., 29 (1940), 322.

The Vitamin B Complex*

(A Review)

By Douglas Frost†

INTRODUCTION

Few subjects could offer more lively interest or greater intricacy of thought than that of the vitamin B-complex. What it is, where it is found, how it functions, how its presence can be detected and quantitatively assessed, and how it can best be used, are questions of fundamental importance in biology and medicine. Indeed, they are tantamount to our understanding of many of the innermost secrets of cellular life.

Although the idea of the vitamin B complex was born in the minds of a few far-seeing men several decades ago, it remained quite vague and intangible in the popular mind until only recently. Now we are on very firm ground in discussing the B com-

* An address to the AMERICAN PHARMACEUTICAL ASSOCIATION, Chicago, Illinois, December 1940.

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