is divisible by the number of grades in the term group and is separable into particular endeavors for rotating service. Such segregations may include, for example: magistral pharmacy; galenical and official preparations; colloidal, isotonic and parenteral solutions; and analytical and control work. Particular attention is also given to bacteriological procedures, sterilizing processes, hydrogen-ion concentration, laboratory reagents and solutions, surgical dressings and preparations and the modern materia medica (including clinical evaluations of experimental material).

Further, since it is the prescription that unites the pharmacist and the physician in the medical arts, particular stress is laid upon the interpretation of such orders. Prescriptions may be properly interpreted upon the basis of intent, bringing into consideration all known facts pertinent or relating to the drug and the patient. It is further contemplated that service will include a directed program of extramural work. Such efforts, essays, reports and reviews will be regularly presented to all members of the staff in regular meetings. Material regarded, by the staff, as of importance to the other departments of the hospital will be submitted thereto for disposition.

It necessarily follows that the adoption of such a plan should also include a definite schedule of remuneration for the individual. It is obvious, despite the attractiveness of the type of work, the graduate student will regard such employment as competitive, and to meet the competitive phase and to maintain the attractiveness of the offer provides no small problem. It is quite generally agreed, to attract graduates of a higher order, that current professional wage scales will have to be paid. In this respect comparisons with medical internships offer a severe change.

A CHEMICAL STUDY OF SULPHUR OINTMENT.

BY LEWIS C. BRITT.*

The industrial, biological and medicinal importance of sulphur have made its quantitative determination a common laboratory procedure. Sulphur has been used as a remedial agent since antiquity and still enjoys popular recognition. Notwithstanding the medicinal importance, little attention seems to have been given to the quantitative determination of sulphur when combined with a fatty base.

Among samples submitted for analysis at the Oregon Board of Pharmacy Drug Laboratory were several of sulphur ointment. These samples were obtained through counter purchases (not prescriptions) made by inspectors in drug stores, which were variously located in the state. A survey of the literature revealed no satisfactory method for a gravimetric determination of sulphur in this preparation. Elsdon (1) has recommended the oxidation of the sulphur to sulphur trioxide by a mixture of bromine and nitric acid, removal of the fat from the resulting mixture by ether extraction, and a gravimetric determination of the sulphur trioxide in the aqueous solution by barium chloride precipitation. The details for conducting the method and data for known samples were not given. The

* Assistant Professor of Pharmaceutical Analysis, Oregon State Agriculture College, School of Pharmacy, Corvallis, Ore.

method was said to give satisfactory results but the reader is not informed as to the significance of this statement. An attempt to determine the accuracy of the method was abandoned due to inability to control the offensive and dangerous bromine vapors.

Volumetric methods for the determination of sulphur in organic combination and mixtures are more numerous. Upton (2), Castiglioni (3) and Allport (4) have suggested volumetric methods and since the completion of this study Fleck and Ward (5) have suggested yet another.

The following method has been found to give dependable results for the determination of sulphur in sulphur ointment:

> Treat about one Gm. of the well-mixed and accurately weighed ointment with 50 cc. of 10 per cent potassium hydroxide solution, boil gently until the lard is saponified and the sulphur converted to soluble sulphides (usually about one-half hour). Add 50 cc. of solution of hydrogen peroxide and digest slightly below the boiling point for thirty minutes, make slightly acid with hydrochloric acid free of sulphur trioxide, heat to boiling, cool, filter and wash the vessel used in the saponification and the filter paper with distilled water. Determine the sulphur trioxide in the filtrate by barium chloride precipitation in the usual way. Correct the resulting weight of barium sulphate by a blank run on the solutions of hydrogen peroxide and potassium hydroxide and multiply the final weight of barium sulphate by 0.1373 to obtain the equivalent weight of sulphur.

After the oxidized solution has been made acid it must be heated to boiling to drive the fatty acids to the surface of the liquid and then thoroughly cooled to allow them to solidify, so they may be removed by filtration. If the fatty acids are allowed to enter the filtrate they will form insoluble barium salts which will cause the result of the analysis to run high.

A blank must be conducted to determine the sulphur trioxide in the alkali and peroxide solutions. If the method is run frequently, considerable time may be saved by standardizing the reagents in quantity and omitting the blank with each sample. The possibility that lard should be included in the blank was suggested and tests were run to ascertain the possibility of error from this source. The samples of benzoinated lard (U. S. P.) examined were found to average 0.0002 Gm. of barium sulphate per Gm. of lard, equivalent to 0.0000275 Gm. of sulphur. This amount is considered negligible and it is not thought to be necessary to include lard in the blank.

The accuracy of the method was determined from analyses conducted on sulphur ointments of known strength. The sulphur used in these preparations assayed 99.576 per cent pure by the U. S. P. X method. The efficiency of the method may be judged by the results in Table I.

Satisfactory results were also obtained with the method by students who ran an analysis of sulphur ointment as a laboratory experiment in courses in drug analysis.

EXAMINATION OF COMMERCIAL OINTMENTS.

A total of thirteen samples of sulphur ointment, collected by drug inspectors from various stores in Oregon, have been examined. With the exception of two, all samples were prepared extemporaneously in the stores. Only three of the samples were found to contain from 14.5 to 15.5 per cent sulphur by weight in benzoinated lard, which were considered to be U. S. P. requirements. In the remaining samples

the amount of sulphur was found to vary from 13.0 to 22.467 per cent by weight and six of these were made with petrolatum base.

TABLE I.

Sample No.	Wt. of Sample.	Per Cent Sulphur Added.	Per Cent Sulphur Found.	Difference.
1	1.6076	7.673	7.666	0.007
1	1.8044	7.673	7.763	0.090
2	1.6741	8.916	8.921	0.005
2	1.7561	8.916	9.029	0.113
2	0.8499	8.916	8.918	0.002
3	0.7670	14.489	14.491	0.002
3	1.1902	14.489	15.505	0.016
3	0.7748	14.489	14.628	0.139
4	1.0785	16.348	16.446	0.098
4	1.0511	16.348	16.350	0.002
4	0.9964	16.348	16.366	0.018

CONCLUSIONS.

1. A workable method, suitable for the gravimetric determination of sulphur ointment, has been devised.

2. The number of samples of sulphur ointment examined indicates a tendency on the part of retail pharmacists to substitute petrolatum for benzoinated lard, as 46 per cent of those examined were made with petrolatum base.

3. If the ointment requires petrolatum or wax to render it stable, their effect on the therapeutic value of the preparation should be determined, to allow for their addition if possible.

4. A study of the stability of the official ointment and ointments prepared with varying amounts of petrolatum and wax would be of interest.

REFERENCES.

(1) Elsdon, G. D., *The Analyst*, 47, 197–202 (1922).
(2) Upton, *Ind. Eng. Chem.*, 10, 518 (1918).
(3) Z. Castiglioni, *Anal. Chem.*, 91, 32 (1932).
(4) Allport, *Quart. J. Pharm. Pharmacol.*, 6, 431 (1933).
(5) Fleck and Ward, *Ibid.*, 7, 177 (1934).

MEDICINE DROPPER TO DELIVER ONE MINIM (APOTHECARY'S MEASURE) PER DROP.*

BY R. A. KONNERTH, R. E. SCHOETZOW AND F. W. NITARDY.[1]

In prescribing potent galenicals such as Tincture of Digitalis, the physician frequently refers to drops when directing dosage. This practice subjects the dose actually administered to wide variations which depend upon the size and shape of countless varieties of droppers on the market.

---

* Section on Practical Pharmacy and Dispensing, A. PH. A., Portland meeting, 1935.

[1] Chemical and Pharmaceutical Laboratories, E. R. Squibb & Sons, Brooklyn, New York.