hospital pharmacist, who should be properly qualified to teach this branch of medicine to them?

I will go further and say that an effort should be made to have the hospital pharmacy included in the rotating services of the hospital. If this could be accomplished the new generation of doctors would be greatly helped. They would learn to eschew the semi-proprietary polypharmaceutical manufactures' salesmen, write U. S. P. and N. F. preparations and only use those newer remedies, the products of real scientific research, which have proven valuable to the profession.

A TRANSPARENT EMULSION OF OIL OF TURPENTINE.*

BY P. A. FOOTE[1] AND C. H. GILLILAND.

Pharmaceutical interest in emulsions seems to never wane. It is truly one of the fine arts of the apothecary to make a good stable emulsion which is therapeutically efficient, palatable and pleasing to the eye. To those who claim that there is no such a thing as pharmaceutical research let them enter this field and they will soon change their mind. Why does this interest continue? There are various reasons, a discussion of which has no place in this paper; however, the authors wonder if one reason might not be the fact that they are more or less spectacular and it is human nature to be interested in spectacular things. Indeed, a successful pharmacist recently advised us that his interest in pharmacy began at the age of five when he witnessed the making of an emulsion. To him it was magic because a dark liquid (compound solution of cresol) was added to clear water and the result was a milk-like preparation. It would not have been magic to the boy if oil of turpentine and water had been mixed in such a way as to give a transparent preparation. Neither would it be magic to the young pharmacy student who has just been initiated into emulsion technique, but he would no doubt be surprised.

Transparent emulsions are made by equalizing the refractive indices of both phases at the same temperature. The subject is not new but it deserves more attention. Some pharmacy textbooks briefly devote a few lines to the theory of them but give no working examples. Other texts do not mention them. The result is that many pharmacy students graduate without having heard of such preparations. Probably the majority of pharmacists have never seen one. The report on transparent emulsions by Whitmore and Linehan (1) gave the authors further interest in the subject with the result that the task of making a transparent emulsion of oil of turpentine of U. S. P. strength was assigned to the junior author as an "Honors" problem for graduation. It is herewith presented hoping that it will arouse more interest in this subject.

PROCEDURE.

All determinations were made with an Abbé refractometer at 23° C.

1. Gelatin Solution.—One gram of high-grade gelatin is dissolved in 10 cc. of hot distilled water, n_d 1.3500.

2. Glycero-Gelatin Solution.—Add to No. 1 an equal volume of U. S. P. glycerin. Product, n_d 1.4171.

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3. Invert Sugar Solution.—Dissolve 2.5 Gm. of tartaric acid in 100 cc. of distilled water, then 200 Gm. of sucrose and heat at 100° C. for two and one-half hours, n_d 1.4963. After twelve hours n_d 1.4838. After two weeks n_d 1.4843. If caramelized decolorize with activated charcoal.

4. Combine by Weight 10 Parts of No. 2 with 100 Parts of No. 3.—This will probably have an idex of refraction slightly higher than the oil of turpentine n_d 1.4701. Water is then cautiously incorporated to reduce the index of refraction to that of the oil. This may require as much as 10% of water.

5. Emulsification.—Place about 10 cc. of No. 4 in a mortar and emulsify a few drops of the oil. Alternately add increasing amounts of each until 15 cc. of the oil has been incorporated and the volume of the finished product is 100 cc. For finer dispersion of the oil, which gives greater stability, pass the emulsion through a hand homogenizer two or three times. Bottle and invert to allow the air and foam to rise. When clear pour into another bottle. It is of course an oil-in-water type.

DISCUSSION.

Because there is a wide difference between the index of refraction of water (1.3328) and the oils, the problem of making transparent emulsions is largely one of finding physiologically inert substances to either build up the refractive index of the aqueous phase or to lower that of the oil phase. The former appears to be easier. Solutions of invert sugar, honey, glucose and Karo corn syrup can be used. The authors found it convenient to prepare invert sugar solutions by heating with a small amount of tartaric acid. Other acids might be used as catalysts but it is our opinion that tartaric acid improves the flavor of this particular emulsion. If necessary the index of refraction of this solution can be conveniently raised by adding liquid glucose (n_d 1.5023). If the emulsion is not perfectly transparent at the adjusted temperature, the index of refraction of the primary phase may be lowered or increased by adding small amounts of water or liquid glucose. To find out which is needed take the index of refraction of the emulsion. If this is higher than the oil, add water. If it is lower, add liquid glucose.

This emulsion appears to be very stable for at least a year when standing in diffused light at room temperature. After eighteen months a few crystals were deposited. After two years it became quite yellow which is to be expected of the turpentine and the sugar in the presence of an acid. A centrifuge at 1800 r. p. m. will readily break the emulsion in a few minutes if prepared by the mortar method alone. Similar treatment will not break it if it has been put through a homogenizer.

There is a peculiar fascination about this subject which has led us to make other transparent emulsions for a later report. The newer emulsifying agents and other chemicals now available in commercial quantities offer interesting possibilities.

SUMMARY.

1. The subject of transparent emulsions deserves more attention.

2. A procedure is given for making a transparent emulsion of oil of turpentine.

REFERENCE.

(1) Whitmore, W. F., and Linehan, R. E., *Ind. Eng. Chem.*, 21, 878 (1929).