

apparatus, to the operation of which we devote some care, we have found multiple distillations unnecessary.

To sum up, I would say that if reactions are to be avoided in the use of these intravenous solutions, cleanliness and care in the preparation are necessary from start to finish. The chemicals used must be of a proper degree of purity, and must be kept free from contamination by dust and moisture. All utensils and apparatus used must be thoroughly cleaned, and then rinsed with freshly distilled water before being used. The distilled water and finished solutions must not be contaminated by undue exposure to dust and bacteria in the air. Sterilization will kill bacteria but does not remove them from solutions. The presence of excessive numbers of killed bacteria in solutions may cause reactions. Filtration and sterilization methods employed must be adapted to the particular product being handled; and suitable methods of preservation must be employed to protect unstable solutions packaged in containers which are not sealed. The use of chemical preservatives, in sufficient quantities to keep solutions sterile, is not permissible where large volumes of dilute solutions are to be administered intravenously.

STUDIES ON BISMUTH SUBSALICYLATE PREPARATIONS.*

BY WILLIAM F. REINDOLLAR.

One of the important recent developments in syphilotherapy is the treatment of that disease by intramuscular injections of suspensions of insoluble bismuth compounds in oil. This drug is alternated with the arsenicals in a course of treatment, thereby reducing the toxic effects, caused by prolonged administration of the latter, and at the same time preventing the spirochete from adjusting itself to the environment produced by either drug. The serious consequences that may follow injections beneath the skin of any product of inferior quality, together with the toxic effects that follow an overdose, make the control both of the qualitative and quantitative aspects of the product a matter of paramount importance.

Bismuth as a spirillicide has been said to be second to arsphenamine and superior to mercury. It is less toxic than either arsenic or mercury, dose for dose, and apparently exhibits no predilection for any particular organ. It is slowly absorbed and probably cumulative. Although numerous forms of this drug are employed we are concerned only with the official product, bismuth subsalicylate. This is described in the U. S. P. X as "a basic salt of varying chemical composition, which, when dried to constant weight at 100° C. yields upon ignition not less than 62% and not more than 66% of bismuth oxide."

In the venereal clinics of the Maryland State Health Department bismuth is administered as the subsalicylate in suspension in olive oil, the concentration being so adjusted that 0.1 Gm. metallic bismuth is received in 1 cc. of oil. The injection is made deep into the gluteal muscles of the upper outer quadrant of the buttock, alternating the right and left sides. For administrations of this type it is evident that a drug must not only contain the correct amount of active ingredient, but must exhibit certain physical and chemical properties, if it is to produce an opti-

* Section on Practical Pharmacy and Dispensing, A. Ph. A., Washington meeting, 1934.

mum effect with a minimum irritation. In such a medicament the crystals must be small and uniform and readily suspended upon agitation. If the crystals are too large they will irritate the surrounding tissue producing fibrosis and induration. If they tend to clump they form irritating masses with the same effect. In either case absorption is materially interfered with. On the other hand if a uniform suspension cannot be obtained, it is impossible to withdraw a sample containing the proper dose of bismuth.

The examination of bismuth subsalicylate suspensions therefore consists of two types of analysis, chemical and microscopic. The former is a quantitative determination of bismuth as set forth in the official assay, the latter method is here described. The sample is thoroughly agitated to produce a uniform appearance of suspension, and a thin glass rod is used to secure a drop and transfer it to a slide. A cover glass is immediately placed on top of the drop of suspension and gently rotated and pressed until a thin uniform smear lies between the slide and the cover slip. These smears are then examined under a magnification of about 450 diameters. The number and size of clumped areas may serve as a basis for a system of grading such as is used for milk sediments, or permanent records may be made by taking photomicrographs.

Six samples, representing well-known brands that are offered to the physician in Maryland, were analyzed by the foregoing procedure. In every case the quantitative requirements for bismuth were met, however the microscopic fields varied considerably. One sample was superior to all the rest, four samples were given intermediate ratings, while still another was distinctly inferior. Thus the microscopic test demonstrates, that, in a group of bismuth subsalicylate preparations, all of which have essentially the same composition, and all of which meet the percentage requirements for active ingredient, there may still be a difference in quality and therapeutic efficacy based on physical properties of the suspended salt.

PROBLEMS IN DENTAL PHARMACY.*

BY A. O. MICKELSON.¹

To understand the pharmaceutical needs of the dental profession, not including prescription writing, necessitates a thorough understanding of modern dentistry. The dentist's medicine cabinet for daily use and the pharmaceutical preparations and chemicals used in his laboratory work should be common knowledge to the pharmacist. The dentist is constantly using acids, alkalies, oxidizing agents, reducing agents, solvents, abrasives, hæmostatics, antiseptics, germicides, anesthetics—local and general, analgesics, sedatives, hypnotics and tonics.

A closer relationship between the two professions, discussing drugs or preparations used in dentistry, is undoubtedly the most effective way to understand the pharmaceutical needs of the dentist, and thus create new possibilities for professional pharmacy. The interview with the dentist should not cover a general scope, but instead study a specific problem, study the problem with the aim of solving his problem with him. Why should the pharmacist attempt to render

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