

of oil of peppermint, add the macerated leaves and enough alcohol to make 1000 mils, macerate for 6 hours and filter.

The failure to direct the addition of sufficient alcohol through the filter to give 1000 mils was doubtless an oversight as this procedure is directed in the formulas for making all of the official spirits, with the exceptions of peppermint and spearmint and aromatic ammonia, and was directed in the U. S. P. VIII for those of peppermint and spearmint. The peppermint displaces a certain volume and this displacement, with the evaporation of alcohol in filtration, causes a loss of approximately six percent in volume, as found by several experiments. No doubt many who prepare this spirit will, through habit, make up the volume after filtration with alcohol, causing a corresponding deficiency in strength in the finished preparation.

Careful examination of Spirit of Peppermint U. S. P. shows that it contains approximately 10.6 percent of oil of peppermint and not 10 percent, as commonly understood. This higher percentage of oil is the result of the loss in volume before referred to, and checks, as will be noted, with the 6 percent loss in volume.

The question as to the correct legal standard, that may be raised under such conditions, demonstrates the importance of having all official formulas direct, whenever possible, a finished quantity either by weight or volume, or a definite number, particularly, when no other requirement is made.

STERILIZED DISTILLED WATER.*

BY E. FULLERTON COOK AND LOUIS GERSHENFELD.

The U. S. Pharmacopoeia IX introduced a process for preparing sterilized distilled water and it is assumed that any trained pharmacist is now prepared and able to furnish that official product on demand.

The directions of the U. S. P. seem simple and without complications, and without experience the druggist may feel that it is an easy task to prepare sterile water and dispense it on order.

Those, however, who have had experience in the making of sterile products, especially when apparatus must be adapted for the purpose and the work conducted under drug store conditions, know the difficulty met with, and the likelihood of failure. If an autoclave is available, its use would always be preferred to the official method, as it insures sterility, but since this is frequently not at hand, especially in a pharmacy, this paper was undertaken to prove the efficacy of the official process of the Pharmacopoeia, that is, boiling in a flask, and also to show the necessity for the most extreme caution, if success is to be attained by this method.

The Water Required.—The Pharmacopoeia directs the use of "freshly distilled water" for sterilizing. This preliminary requirement must not be ignored, since distilled water, even though but a few days old, will be teeming with bacterial life and if sterilized, would contain the dead organisms, and thus produce a "bacterin." It would also contain the toxins produced in the water during the life of the bacteria and such a water, if used as the solvent for a substance to be used as an intravenous or subcutaneous injection, would produce systemic effect and might cause serious consequences from the introduction of foreign proteid.

* Read before Section on Practical Pharmacy and Dispensing, A. Ph. A., Chicago meeting, 1918.

TABLE I.—EXAMINATION OF WATER FOR STERILIZATION.

Fermentation Test.	Incubation on agar plates after standing				
	1 day.	4 days.	7 days.	10 days.	
1. Tap Water from 145 N. 10th St., Phila. collected in sterile container after running for 5 minutes.....	Negative	About 120 colonies per mil	+	+	+
2. Tap Water, distilled as directed by the U. S. P. IX, using Liebig condenser, and collected in a sterile flask, under cover.....	...	Slight growth, a few isolated colonies per mil	+	+	+
3. Distilled water, collected directly from Stokes Automatic Still, in a sterile flask.....	...	Slight growth as in No. 2	+	+	+

TABLE II.—STERILIZATION OF WATER.

	Incubation on agar plate after standing			
	1 day.	4 days.	7 days.	14 days.
4. Distilled water No. 2—boiled for 30 minutes in sterile hard-glass flask, stopped with cotton. (U. S. P. IX ⁴ method).....	Sterile	—	—	—
5. Distilled water No. 2—boiled for 30 minutes in sterile glass flask closed with sterile rubber stopper and tubes (see Fig. 1).....	Shown several isolated colonies per mil*	+	+	..
6. Distilled water No. 2, contained in a sterile hard-glass flask stopped with parchment paper, and heated in Arnold steam sterilizer for 30 min....	Shown several isolated colonies per mil	+	+	..
7. Distilled water No. 3—boiled for 30 minutes in a sterile hard-glass flask stopped with cotton. (U. S. P. IX method).....	Shown only one colony	I colony	I colony	No growth
8. Distilled water No. 3—boiled for 30 minutes in a sterile hard-glass flask, closed with sterile rubber stopper and tubes (see Fig. 1).....	Sterile	—	—	—
9. Distilled water No. 3 in a sterile hard-glass flask, stopped with cotton and capped with parchment paper and heated in Arnold steam sterilizer for 30 minutes.....	Not sterile	+	+	+

* The supposition is that the boiling was not active enough in Nos. 5 and 7.

TABLE III.—TEST ON UNSTERILIZED FLASK.

	Incubation on agar plate after standing			
	1 day.	4 days.	7 days.	10 days.
10. Tap water in an unsterilized flask, stopped with cotton and boiled for 30 minutes.	Not sterile	+	+	+
11. Tap water in an unsterilized flask and closed with rubber stopper and tubes (see Fig. 1) and boiled for 30 minutes.	Not sterile	+	+	+
12. Tap water in an unsterilized flask, stopped with cotton and heated for 30 minutes in an Arnold sterilizer.	Not sterile	+	+	+

TABLE IV.—STERILIZATION IN THE PRESENCE OF SPORE-BEARING AND NON-SPORE-BEARING ORGANISMS.

	Incubation on agar plate after standing			
	1 day.	4 days.	7 days.	10 days.
13. Distilled water, to which an active culture of staphylococcus was added, placed in sterile flask, stopped with cotton and boiled actively for 30 minutes.	Sterile	—	—	—
14. Distilled water, to which an active culture of <i>B. subtilis</i> was added, placed in sterile flask, stopped with cotton and boiled actively for 30 minutes.	Sterile	—	—	—

Ordinary tap water is even worse, as it often contains dissolved solids in addition to the bacterial life and toxins (see Table I, experiment No. 1). Therefore only "freshly distilled water" must be used.

The Flask.—The Pharmacopoeia directs that "a flask of hard glass" must be used. This may be any of the non-soluble glass flasks now on the market. If an ordinary chemical flask is used, the hour's boiling will cause the solution of appreciable quantities of soluble silicates, and when the water cools these silicates separate in fine, needle-like crystals and render the water unfit for use. The directions require also that this flask be sterilized before using, which means dry heat, at from 160° to 170° C., for two hours (or by autoclave sterilization) (see U. S. P. IX, Part II, p. 616). To prove that this precaution is necessary, the boiling process was carefully tried, using an unsterilized flask. In no instance was the water sterile. (See Table III, Nos. 10, 11, 12.)

The Process.—The Pharmacopoeia directs that the freshly distilled water be placed in a sterile flask of hard glass, stopped with sterilized absorbent cotton and boiled for thirty minutes.

These directions were strictly followed, and the results are reported in experiments Nos. 4 and 7. No. 4 was sterile on the first day and remained sterile for at least two weeks. No. 7 showed one colony per mil at first, but gave no growth on the 14th day. The degree of evaporation in the two flasks indicated that No. 7 had not been boiled as actively as No. 4, which probably accounted for its unsterile condition. This same condition existed in Nos. 5 and 8; less evaporation in No. 5 corresponded with the result—an unsterile condition.

Further experiment on this point shows the necessity of directing "active boiling" in the U. S. P. process, if sterility is to be insured.

Because of the difficulty of maintaining sterility in distilled water and normal salt solution when portions are to be withdrawn, the cotton plug was replaced with a sterile rubber stopper carrying two glass tubes (see Fig. 1). One of these tubes serves as an intake for air, being plugged with cotton and extending almost to the bottom of the flask. The other permits the water to flow from the flask when inverted and is constructed on the siphon principle so that all liquid drawn into the tube will be discharged and not drawn back into the flask. The sterility of the outlet is insured, when water is to be drawn, by dipping it for a few moments into chloroform in a bottle. The first water that flows from the flask washes out the chloroform and is discarded.

This apparatus proved very satisfactory, the stopper being inserted before boiling the water. Experiments Nos. 5 and 8 show the result of their use, No. 5 not being "actively boiled."

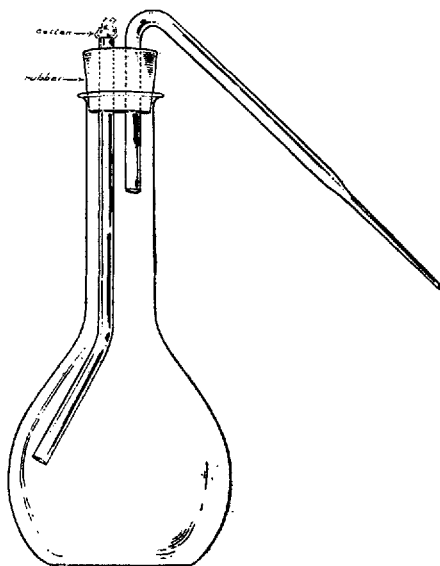


Fig. 1.—Sterilizing Flask.

The use of the Arnold sterilizer live steam for 30 minutes did not produce a sterile product in any instance (see experiments Nos. 6 and 9). Evidently this method requires, reheating on successive days to be satisfactory.

It has been suggested that probably a sterile, freshly distilled water might be prepared by direct distillation with a glass Liebig condenser, collecting the distillate in a sterile flask, under aseptic conditions. This method did not yield a sterile product in any instance (see experiment No. 2).

Conclusions.—Use the autoclave method if practicable for preparing sterilized distilled water and suggest it in the U. S. P. text. Always use freshly distilled water and a sterile, hard-glass flask. If the boiling method is to be followed, stopper the flask with absorbent cotton or the tubes and stopper, heretofore suggested, and boil the liquid actively for at least thirty minutes.

PRESCRIPTION CLINIC.*

BY CHARLES H. LAWALL AND IVOR GRIFFITH.

(1)	Sodium Salicylate.....	2 drachms.
	Sodium Bromide.....	1½ drachms
	Caffeine Citrate.....	36 grains
	Peppermint Water.....	1½ fluidounces
	Syrup.....	2 fluidounces

At a recent meeting of the Pittsburgh Branch, A. Ph. A., the foregoing prescription was discussed and it was said that it was twice prepared by different dispensers and each time exhibited a brown precipitate. According to the journal in which the article appeared suggestion was made that the precipitate was probably due to some impurity present in the sodium salicylate or to a trace of iron due to coming in contact with the spatula (?), used in compounding. These were mere conjectures, however, and the filled prescription was not exhibited.

Filling the prescription as it stands, with sodium salicylate U. S. P., and without a *spatula* (!!!), resulted in the unsightly mixture shown herewith and, no matter in what order the ingredients were mixed, the same reaction was in evidence. The precipitate is salicylic acid. It is simply a case of the stronger organic acid, citric acid of the caffeine citrate (which is not a true salt but a mixture), displacing the weaker organic acid, salicylic acid from its combination with sodium. The alkaloidal caffeine goes into solution. The incompatibility is corrected by using caffeine (alkaloid) 18 grains instead of the 36 grains of the caffeine citrate.

(2)	Thymol Iodide.....	1 drachm
	Zinc Paste (Lassar).....	
	(without salicylic acid).....	8 drachms

A student brought this prescription in with the statement that it had resulted in a dark ointment compared with the product dispensed by another phar-

* Presented before Section on Practical Pharmacy and Dispensing, A. Ph. A., Chicago meeting, 1918. Several of the prescriptions were discussed; Charles H. LaWall, H. P. Hynson, J. H. Beal, J. C. Peacock, C. M. Ford, and others participated in the discussion.