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PROTECTION OF VITAMINOUS OILS

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This invention relates to the protection of vitaminous oils, particularly with respect to vitamin content and palatability.

Hydroquinone has been recognized by several investigators as useful in checking the deterioration to which the vitamins of fish-liver and vegetable oils, and the oils proper, are subject on exposure to oxygen. Hitherto the role of the hydroquinone has been deemed to be a species of negative catalysis; or at any rate it has been thought that dissolving in the oils a small proportion, less than or no more than the saturation amount, of hydroquinone could be relied on as a method of securing adequate protection for an unlimited time. Experience has shown, however, that this method of treatment cannot be depended on to safeguard the oils for the many months that often pass between the packaging of the oils and their consumption; on the contrary, oils to which an addition of this kind has been made suffer a considerable vitamin loss, as well as a degradation of taste and odor, during the course of storage, especially if the oils encounter conditions particularly favorable to oxidation and/or if they are contained in vessels pervious to air, like gelatin capsules.

An object of this invention is the provision of a method whereby vitaminous oils may be afforded protection to a higher degree and/or for a longer period than has been possible by methods hitherto employed. A further object is the provision of vitaminous oils endowed with such protection.

It has been found that the hydroquinone functions more or less quantitatively, that it becomes progressively inactivated with lapse of time, that its preservative effect increases with its concentration, and that vitaminous oils dissolve it too scantily—thus, a saturated solution of hydroquinone in halibut-liver oil at room temperature has a concentration of only about 0.03 percent—to be protected thereby sufficiently to meet the not uncommon commercial exigencies. It was accordingly necessary to incorporate extra hydroquinone (by which is meant herein hydroquinone in excess of the concentration the vitaminous oil alone would dissolve at room temperature) into the oil; and since solids would be less active than dissolved substances and since the presence of solids, as deposits or sediment, would be objectionable in oils intended for internal use, it was also necessary to incorporate the extra hydroquinone into the oil as a solute.

In the practice of this invention the incorporation of extra hydroquinone into vitaminous oils

as a solute is made possible, and the protection of the oils is correspondingly enhanced, by adding to the oils a carrier which is miscible with the oils and in which the hydroquinone is more soluble than in the oils.

Among the suitable carriers are those in the class embracing alcohols, aldehydes, ethers, esters, essential oils, and essential-oil fractions. Specific examples include ethyl alcohol (absolute), normal-propyl alcohol, isobutyl alcohol, benzyl alcohol, isovaleraldehyde, salicylaldehyde, cinnamaldehyde, dimethyl ether, diethyl ether, ethyl acetate, ethyl butyrate, methyl salicylate, spearmint oil, peppermint oil, menthol. Oxidizing materials should of course not be present in the carriers, as peroxides in diethyl ether. Some carriers, on account of giving an unpleasant taste, may be unsuitable for use in oil to be drunk but satisfactory for capsuled oil. On the other hand, essential oils, besides acting as carriers, are preferred for the agreeable flavor they impart.

Among the oils to which the invention is advantageously applicable are halibut-liver oil, cod-liver oil, swordfish oil, various other fish and fish-liver oils, and vegetable oils.

By means of such carriers, vitaminous oils are enabled to hold extra hydroquinone in solution and in consequence to withstand for longer periods and/or under more adverse conditions the deteriorative effects of oxygen on the vitamins and on the oils proper. Thus, the physical, chemical, and therapeutic stability of halibut-liver oil is raised to a point where it gives full assurance for ordinary circumstances, by increasing its hydroquinone content in this manner to about 0.1 percent.

Introduction of the hydroquinone may be effected by mere admixture of the oil with a solution of the hydroquinone in the carrier. Thus, 0.05 to 0.2 g. hydroquinone may be dissolved, with gentle warming if necessary, in 0.5 to 3.0 cc. of the carrier selected, and the solution may be well mixed with enough of the oil to make a total volume of 100 cc.

Addition to 100 cc. halibut-liver oil of 2 cc. absolute alcohol containing in solution 0.1 g. hydroquinone or 5 cc. absolute alcohol containing in solution 0.3 g. hydroquinone, yields, respectively, a 0.1 percent or a 0.3 percent solution of hydroquinone in halibut-liver oil.

Mixture of 80 cc. halibut-liver oil with 5 cc. peroxide-free diethyl ether in which 0.4 g. hydroquinone has been dissolved, gives a concentration of 0.5 percent, which may be reduced to any desired degree by addition of more oil.

A 0.05 percent solution may be produced by dissolving 0.05 g. hydroquinone in 0.5 cc. normal-propyl alcohol, isobutyl alcohol, or ethyl acetate, warming if necessary, and adding the solution to 100 cc. halibut-liver oil.

Dissolving 0.005 g. hydroquinone in 0.05 g. cinnamaldehyde, ethyl butyrate, peppermint oil, or menthol, and adding the solution to 10 cc. halibut-liver oil, secures a 0.05 percent concentration of the hydroquinone in the oil; and doubling the weights of the hydroquinone and the carriers raises the concentration to 0.1 percent.

By slightly warming 0.05 g. hydroquinone with 0.68 cc. spearmint oil and adding the solution to 100 cc. halibut-liver oil there is obtained a 0.05 percent concentration of hydroquinone; and the spearmint oil, moreover, imparts to the halibut-liver oil so agreeable a flavor as to make an especially palatable and therefore acceptable product. By employing 0.07 g. or 0.1 g. hydroquinone instead of 0.05 g., and increasing the amount of spearmint oil if necessary, correspondingly higher concentrations of hydroquinone may be secured.

It is to be understood that the foregoing examples are merely illustrative and by no means limitative of the invention, which may be variously otherwise embodied—as with respect to particular oils, carriers, proportions, and procedures—within the scope of the appended claims.

I claim:

1. The method of enhancing the protection of vitaminous oils that comprises incorporating extra hydroquinone therinto with the aid of a carrier which is miscible with the oils and in which the hydroquinone is more soluble than in the oils.

2. The method of enhancing the protection of vitaminous oils that comprises incorporating extra hydroquinone therinto as a solute with the aid of spearmint oil.

3. The method of enhancing the protection of vitaminous oils that comprises incorporating extra hydroquinone therinto as a solute with the aid of an ether.

4. The method of enhancing the protection of vitaminous oils that comprises incorporating extra hydroquinone therinto as a solute with the aid of an alcohol.

5. Vitaminous oils containing extra hydroquinone and a carrier which is miscible with the oils and in which the hydroquinone is more soluble than in the oils.

6. Vitaminous oils containing extra hydroquinone and spearmint oil, the latter being a carrier for the former.

7. Vitaminous oils containing extra hydroquinone and an ether, the latter being a carrier for the former.

8. Vitaminous oils containing extra hydroquinone and an alcohol, the latter being a carrier for the former.

9. Halibut-liver oil containing extra hydroquinone and a carrier which is miscible with the halibut-liver oil and in which the hydroquinone is more soluble than in the halibut-liver oil.

10. Halibut-liver oil containing extra hydroquinone and spearmint oil, the latter being a carrier for the former.

11. The method of enhancing the protection of vitaminous oils that comprises incorporating extra hydroquinone therinto as a solute with the aid of an essential oil.

12. Vitaminous oils containing extra hydroquinone and an essential oil, the latter being a carrier for the former.

13. Vitaminous oils containing extra hydroquinone and diethyl ether, the latter being a carrier for the former.

14. Vitaminous oils containing extra hydroquinone and ethyl alcohol, the latter being a carrier for the former.

15. Halibut-liver oil containing extra hydroquinone and an essential oil, the latter being a carrier for the former.

16. Halibut-liver oil containing extra hydroquinone and an ether, the latter being a carrier for the former.

17. Halibut-liver oil containing extra hydroquinone and an alcohol, the latter being a carrier for the former.

18. Halibut-liver oil containing extra hydroquinone and diethyl ether, the latter being a carrier for the former.

19. Halibut-liver oil containing extra hydroquinone and ethyl alcohol, the latter being a carrier for the former.

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