

A NEW METHOD FOR REFINING SHARK LIVER OIL ON A COMMERCIAL SCALE AND RECOVERY OF VITAMIN 'A' BY PARTIAL SAPONIFICATION FOR PRODUCTION OF STANDARD QUALITY AS WELL AS HIGHER VITAMIN 'A' POTENCY OIL

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ABSTRACT

This is a process for the refining and production of shark liver oil by partial saponification either with caustic soda or caustic potash. In this process cottonseed oil was used as an oil solvent for transference of vitamin from crude shark liver oil. Higher vitamin 'A' potency oil was also produced from lower potency crude shark liver oil by following this process.

INTRODUCTION

Despite synthetic preparation, fish liver oil will continue to be a potential source of vitamin A in the world market. The shark liver oil industry in Pakistan has a great future. The methods for extraction and refining of shark liver oil as practised in other countries and suggested by S. Maqsood Ali and others do not however, seem economical in this country. Sharks from tropical waters yield liver oil of comparatively higher melting point. Only a small fraction of oil can be obtained in liquid state when wintered at 20°-22°C. The major portion of crude oil remains solid and unless vitamin A could be recovered from solid fraction easily, the liver oil industry is not a sound proposition. The method suggested by S. Maqsood Ali and others is the separation of liquid oil at 15°C first and then the recovery of vitamin A by either extraction from the solid fraction after saponification. The entire procedure beginning from the extraction of oil leading to the finished product has not been made easy or inexpensive. As a result no industrialist has so far come forward for exploitation although sufficient raw materials are available in both wings of Pakistan under the existing conditions.

The method now evolved is inexpensive and easy to operate without much installation. It works on the principle of extraction of vitamin A&D from partially saponified crude oil through the agency of cottonseed or any liquid vegetable

oil. By extracting three times in succession, transference of vitamin A to the extent of 95% has been achieved. For partial saponification caustic potash or caustic soda may be used although the former works better.

EXPERIMENTAL

In a 15 liter-drum provided with two taps was placed 5 lb. (2.3 kg.) of crude shark liver oil (4,000 I.U./g.). About 145 g. of caustic soda dissolved in 150 ml. of water was introduced and stirred thoroughly. The mixture was allowed to stand 48 hours. About 5 lb. of cotton-seed oil heated to 60°C was added and made into a uniform mass by stirring. This was allowed to stand for 4 hours. Two liters of hot saturated brine was added to precipitate soap into a granular mass, and was allowed to stand for 24 hours. Supernatant liquid oil was removed by the upper tap to the extent of 5 lb. and was collected in a second drum with two taps as before. The oil washed with hot brine (90°C) and then with hot water was separated by the upper tap and was centrifuged in an oil centrifuge. This was termed as first extract. The potency of the oil was determined and found to be 2,500 I.U./g. Transference of vitamin was 62%. To the residual mass a further quantity of 5 lb. of fresh cotton-seed oil heated to 60°C was added. The mass was stirred thoroughly and allowed to stand overnight. About 5 lb. of oil was removed, washed and centrifuged as before. The potency of this second extract was determined and found

to be 1,000 I.U./g. Transference of vitamin in this case was 25%.

The residual mass was treated for the third time with another lot of fresh cotton-seed oil. The oil recovered was 5 lb. with a potency of 300 I.U./g. Transference of vitamin in this case was 8%. The total transference of vitamin by these treatments was 95%. The solidifying point of the crude oil was 30-35°C and that of the product was 12°C.

By blending the oil impregnated with vitamin A obtained by above treatments a standard product of average potency was produced. The third extract having a low vitamin potency was used for transference of vitamin in subsequent operations. To prevent any deposition of "solid oil" in cold weather the oil was wintered at 16°C. The wintering period was 5 days at a stretch.

In the above experiment saponification had also been effected by caustic potash. The soap in this case separated from the unsaponified oil and occupies a separate layer at the bottom. No brine treatment was necessary. Separation of the oil-solvent used for transference of vitamin

proceeded with greater ease. Percentage of transference of vitamin A in the first extract was found slightly higher than that with caustic soda.

The residue was utilised for the production of cheap quality washing soap as by-product.

The procedure was further utilised to produce higher potency oil from lower one. Vitamin-bearing oil recovered as the first extract, was used for transference of vitamin in the second operation. By extending the process to the next operation a higher potency oil was produced.

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