

STUDIES ON METHODS OF EXTRACTING VITAMIN A AND OIL FROM FISHERY PRODUCTS^{1/}

PART I—VITAMIN A POTENCIES OF OILS FROM GRAYFISH LIVERS OBTAINED BY EXTRACTION WITH PETROLEUM ETHER AND BY COOKING WITH WATER

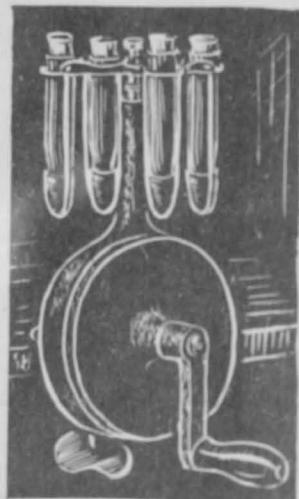
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ABSTRACT

Grayfish livers held at different temperatures were extracted with petroleum ether and by cooking with water. The vitamin A content of the oil extracted with petroleum ether was about one percent higher than for the oil extracted by cooking with water.

Incidental to an experimental study on the deterioration of vitamin A in stored grayfish livers,^{2/} analytical data were obtained whereby a comparison could be made of the vitamin A potencies of the liver oils extracted with petroleum ether and water. In the analysis of the vitamin A content of fish livers, it is customary to extract the vitamin A and oil from the livers by solvent extraction.^{3/} However, in special instances, it is desirable to render the oil and vitamin A from the livers by cooking them with water. This report presents the values for vitamin A content when these two methods of extraction were used.

In this experiment, approximately 30 pounds of fresh grayfish livers were passed through a meat grinder, stirred until homogeneous, and filled into pint Mason jars. After the jars were covered, they were divided into three groups. The first group was stored at room temperature (23° C.). The second group was stored in melting ice (0° C.), and the third group was stored in a sharp freezer (-22.5° C.).



CENTRIFUGE

At the start of the storage period and periodically thereafter, two or three jars of ground grayfish livers from each of the three groups were opened for examination. The contents of each jar was made homogeneous by means of a Waring blender, and duplicate samples of three to five grams were weighed in shaking bottles. After adding 25 milliliters of petroleum ether and one teaspoon of anhydrous sodium sulfate, the bottles were placed in a shaking machine for approximately one hour and then centrifuged until a clear solvent layer was obtained. The oil in the petroleum ether layer was used to determine the vitamin A potency of the liver material in each jar.

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^{1/}This is the first of a series of articles on this subject. Others will appear in subsequent issues.

^{2/}Studies on the Deterioration of Vitamin A in Fish Livers and Liver Oils. Part I - Loss of Vitamin A and Stability in Grayfish Livers in Storage, by F. B. Sanford, D. T. Miyauchi, and G. I. Jones. Commercial Fisheries Review, February 1947, pp. 11-15.

^{3/}Preliminary Procedures for the Analysis of Vitamin A in Fishery Byproducts. Commercial Fisheries Review, January 1947, pp. 40-42.

Liver samples from the same lot were placed in a large beaker and an equal amount by weight of hot water was added to it. After cooking in a water bath for about 20 minutes, the mixture was centrifuged until the oil separated to the top. A layer of anhydrous sodium sulfate was placed over a filter paper in a funnel, and the oil was filtered through it to remove any traces of moisture and suspended solids. The vitamin A potency of the water-extracted oil was determined by duplicate analyses, by spectrophotometric methods, and the average potency was calculated.

The average vitamin A potencies of the solvent-extracted oil and of the water-extracted oil analyzed at the end of each storage period are recorded in Table 1.

Table 1 - The Vitamin A Potencies of Oils Extracted by Petroleum Ether and Water

Period of Storage Days	AVERAGE VITAMIN A POTENCY		Difference in Potency Between Water Extracted and Solvent Extracted Oils Relative Percent
	Solvent Extracted Oil	Water Extracted Oil	
	USP Units Per Gram	USP Units Per Gram	
<u>Storage at Room Temperature (18° to 27° C., average = 23° C.)</u>			
0	14,215	14,280	+0.46
7	14,380	13,960	-2.92
14	14,288	14,000	-2.02
21	14,316	14,165	-1.06
28	14,504	14,265	-1.65
			Average = -1.91
<u>Storage in Ice 0° C.</u>			
22	14,309	14,070	-1.67
29	14,437	14,105	-2.30
43	14,350	14,250	-0.70
			Average = -1.56
<u>Storage in Refrigerator (-28° to -20° C., Average = -22.5° C.)</u>			
23	14,356	14,290	-0.46
49	14,400	14,315	-0.59
189	14,065	14,274	+1.49
287	14,116	13,960	-1.10
			Average = -0.16
			Average Difference of the 12 analyses = -1.04

In 10 out of the 12 analyses, the average vitamin A potency of the water-extracted oil was lower than that of the solvent-extracted oil. The deviation was the largest for oils rendered from livers stored at room temperature and the smallest for oils rendered from livers stored in the refrigerator. The average deviation for all the samples was -1.04 percent. Statistical analyses showed that an average deviation of -1.04 percent is significant.

