

Studies on Kitol. III. The Effect of Sunlight, Air and Heat on the Vitamin A and Kitol Fractions

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In the 1st Report, the separation of Vitamin A and kitol fractions from unsaponifiable matter of a whale liver oil was described. In order to refine kitol, it became necessary to know its properties, chiefly its stability, and the effect of sunlight, air and heat on these two fractions were examined.

- 1) The sunlight has a considerable effect on both fractions. Direct radiation of sunlight on 0.1% alcoholic solution of Vitamin A fraction destroyed one-half the amount of Vitamin A in 3 hours and that on kitol fraction destroyed one-half of it in 4 hours.
- 2) Continuous passage of air through 0.1% alcoholic solution of kitol fraction showed no marked effect on kitol but the same process on Vitamin A fraction resulted in the destruction of about $\frac{2}{3}$ the amount of Vitamin A present after 5 hours.
- 3) Boiling 0.1% alcoholic solution of kitol did not show any damage to kitol in 12 hours but the same treatment on Vitamin A fraction resulted in the destruction of ca. $\frac{1}{7}$ the amount of Vitamin A.

As a result, it can be stated that Vitamin A is very unstable toward sun light and air, and is slightly effected by heat. Kitol, on the other hand, is fairly stable against heat and oxygen but is considerably sensitive to light.

EXPERIMENTAL

The Vitamin A and kitol fraction obtained by the method as described in Report I were dissolved in absolute alcohol to obtain a 1% solution, respectively. With this solution, following experiments were carried out the amount of Vitamin A and kitol remaining in the respective solutions were determined by measuring the extinction coefficient at $290 m\mu$ for kitol and at $328 m\mu$ for Vitamin A.

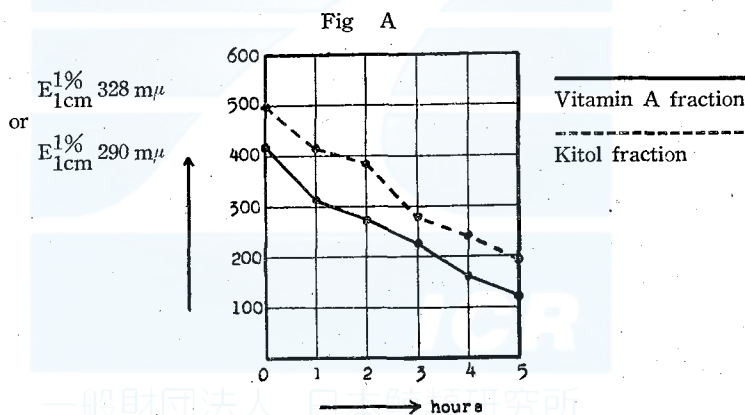
1) The Effect of Light

30 cc. each 0.1% alcoholic solution of Vitamin A and kitol fractions were

placed in 5 graduated test tubes (dia. ca. 1.3 cm, length ca 21.5 cm, colorless, hard glass) each and after being stoppered, were radiated to direct sunlight (on 6th September 1949. Fine. From 1200 to 1700). One test tube each of Vitamin A and kitol fractions were taken every one hour and the values were determined. After radiation was completed, the content of the test tube was diluted with absolute alcohol to bring the concentration to 0.002% and the extinction coefficient was measured with Carl Zeiss' spectrophotometer, that for Vitamin A fraction at $328\text{ m}\mu$, and for kitol fraction at $290\text{ m}\mu$. The results of the measurements are shown in Table I and Fig. A.

Table I. The Influence of Sunlight
(Vitamin A Fraction)

Radiation time	0 hr.	1 hr.	2 hrs.	3 hrs.	4 hrs.	5 hrs.
$E_{1\text{cm}}^{1\%} 328\text{ m}\mu$	417	312	278	228	156	125
(Kitol Fraction)						
$E_{1\text{cm}}^{1\%} 290\text{ m}\mu$	500	417	385	278	243	192



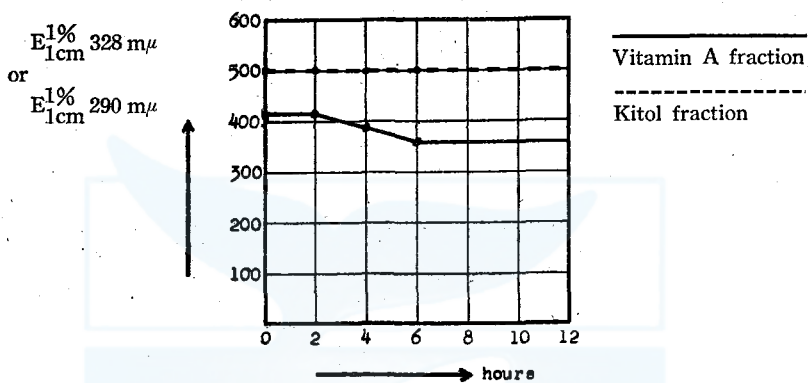
2) The Effect of Heat (78°C)

500 cc. each of 0.1% alcoholic solutions of both fractions were taken into 1 l. Erlenmeyer flask and boiled with a reflux condenser in a boiling water bath (78°C). After each 2 hours period, the solution was slightly cooled and 30 cc. of it was drawn out for testing. This was diluted to 0.002% strength with absolute alcohol and determinations made with spectrophotometer. Results are shown in Table II and Fig. B.

Table II. The Influence of Heat (78°C)
(Vitamin A Fraction)

Heating time	0 hr.	2 hrs.	4 hrs.	6 hrs.	12 hrs.
$E_{1\text{cm}}^{1\%} 328 \text{ m}\mu$	417	417	385	360	360
(Kitol Fraction)					
$E_{1\text{cm}}^{1\%} 290 \text{ m}\mu$	500	500	500	500	500

Fig. B



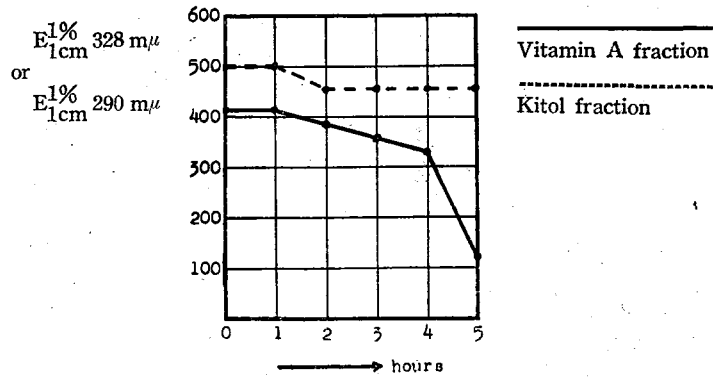
3) The Effect of Air

15 cc. each of 0.1% alcoholic solution of both fractions were taken in the graduated test tubes (as described above), and the air was passed through this solution of the extent of its surface is continuing constantly noise by means of a glass tube measuring ca. 0.5 mm. in inside diameter. This procedure was carried out from 1 to 5 hours. When the passage was stopped, each glass tube was washed with little alcohol and this washing was added into the glass tube and the volume brought correctly with absolute alcohol to 15 cc again (alcohol evaporated ca. 1.5 cc. per hour during passage of air). Absolute alcohol was further added to this solution to make it a 0.002% solution and the value were determined as previously. Results are shown in Table III and Fig. C.

Table III. The Influence of Air
(Vitamin A Fraction)

Passage time	0 hr.	1 hr.	2 hrs.	3 hrs.	4 hrs.	5 hrs.
$E_{1\text{cm}}^{1\%} 328 \text{ m}\mu$	417	417	385	360	333	125
(Kitol Fraction)						
$E_{1\text{cm}}^{1\%} 290 \text{ m}\mu$	500	500	455	455	455	455

Fig. C



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