CHAPTER 12

MUTTON TALLOW STEARIN

§ 1. COMPOSITION

530

	BY WEIGHT		BY VOLUME
Oxygen…….	9.454	100	1
Carbon……..	78.776	833.3	10.89
Hydrogen……..	11.770	124.5	19.98*

§ 2. PHYSICAL PROPERTIES

531. It is white and much less glossy than stearic acid, spermaceti and cholesterol. It congeals at 44°C and when cooled slowly, it crystallizes in the form of very fine needles.

532. It evaporates *in vacuo* without decomposing[1]. It remains odorless when it has not been exposed to air.

§ 3 CHEMICAL PROPERTIES THAT ARE OBSERVED WITHOUT THE STEARIN BEING ALTERED

533. 100 parts of boiling alcohol with a density of 0.795 (g/mL) dissolve 16 parts of stearin. The solution deposits small light needles that agglomerate into flakes.

534. It has no effect on colored reagents.

§ 4. CHEMICAL PROPERTIES THAT ARE OBSERVED WHEN THE STEARIN IS ALTERED

535. Caustic potash decomposes it into stearic acid, palmitic acid and oleic acid, the mixture of which melts at 53°C[2]. On cooling, the acids congeal into fine, small needles that radiate outwards.

536. When distilled in contact with air, part is volatilized without alteration and the other part is decomposed into carbon dioxide, olefiant

* It had been obtained by alcohol extraction. I presume it retained a very small amount of this liquid

gas, a non-acid aromatic compound, red and brown oils, acetic and sebacic[3] acids, water and carbon.

537. When the stearin is heated in contact with air, it burns like tallow.

Effect of sulfuric acid of 66 degrees and contact with air

538. 0.2 g of mutton tallow stearin were placed in a glass tube with an internal diameter of 10 mm together with 2 g of sulfuric acid. At the moment of contact, the stearin turned yellow. After two hours, it had not dissolved and had become more strongly colored. The acid adjacent to the stearin had turned yellow and it had a noticeable odor of sulfur dioxide. After twenty-four hours, the stearin seemed to have softened. It had become more strongly colored, just like the acid; there was sulfur dioxide in the tube. After a week, the stearin had been reduced to a solid material forming a single mass covering the sulfuric acid. The part of the stearin in contact with this acid had caused it to turn brownish yellow, to a certain depth.

Litmus paper was barely turned red by the sulfur dioxide present in the tube as a gas.

539. When the tube is exposed to a temperature of 100°C, the stearin melts and dissolves when agitated. It liberates sulfur dioxide without effervescence. The solution becomes orangey red; it is perfectly transparent but viscous.

540. At a temperature above 100°C, there is a lively effervescence, evolution of sulfur dioxide and the stearin is reduced to carbon.

Effect of nitric acid

541. At ambient temperature, 2 g of stearin show no change when brought into contact with 200 g of nitric acid with a reading of 32 degrees on the hydrometer. After heating for an hour, only a small amount of nitrous vapor has been evolved. By operating as described (46), an almost colorless residue weighing 1.83 g is obtained; it is partially crystalline and can be separated into an *aqueous extract* A and an *alcoholic extract* B.

A. Aqueous extract

542. It yields *acid crystals* and a yellow mother liquor that is not at all astringent and does not form a precipitate with limewater.

Acid crystals

543. They are similar to those obtained when stearic acid is treated with nitric acid, with the difference that with caustic potash they form a salt with less pronounced rosette crystals.

B. Alcoholic extract

544. After evaporation to dryness, the residue weighs 0.27 g. If it is dissolved again in cold alcohol and water is added to the solution, this results in: 1. an *oil* that is gathered in droplets and 2. an *aqueous liquid.*

545. It is yellow; its taste is bitter and sharp. It does not turn dry litmus paper red but does color wet litmus paper. It is highly soluble in aqueous potassium hydroxide; it forms an insoluble compound with baryta water that seemed to me to be able to dissolve in an excess of baryta water. 1. Oil

546. It contains the same substances as extract *B*. 2. Aqueous liquid

§ 5. OCCURRENCE

547. It occurs in mutton tallow, beef tallow and lard.

6. PREPARATION

548 (See Book III, Chapter 3.)

§ 7. NOMENCLATURE

549. I have given this substance the name *stearin,* which is derived from στέαρ, "tallow", because it is the immediate principle that is most abundant in mutton tallow.

§ 8. HISTORY

550. I discovered it in 1813 but its description was not read at the Academy until April 4, 1814. (See *Olein,* § 8.)

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[1] The observation that triglycerides with a high stearic acid content would be volatile is rather unlikely.

[2] Such a melting point is called the "titer" of the fat. It is a means of characterization fatty materials that in practice is limited to animal fats.

[3] Sebacic acid is decanedioic acid, $HOOC(CH_2)_8COOH$, a common degradation product of fatty acids with a double bond at the 9-position.