CHOLESTEROL FROM PRAWN-HEAD WASTE

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[A process is described for the isolation of Cholesterol from the fat obtained from prawn head-waste. Cholesterol of about 94 percent purity is obtained. The final yield on the basis of fat is about 2 per cent.]

Introduction

The presence of cholesterol in the unsaponifiable fraction of oil from fishes like mackerel, salmon etc, and shell fish has been reported by several authors. (Svava Kristjanson (1951), Hilditch and Pedelty (1937), Doree (1909), Miescher (1874), Tsujimoto and Koyangi (1934); (1935), Pihl (1952). Bailey (1952) reported fairly high percentage of cholesterol in head oil of American shrimp waste. In an intensive study on the utilizatfon of prawn shell and head, which constitute a sizeable portion of the wastes in prawn processing factories, the authors found that the oil extractod from the head portions (averaging 6%) contains an appreciable amount of cholesterol. An attempt was subsequently made to extract the compound in a fairly pure form.

Materials and methods

The prawn head waste material, collected immediately after processing from the factories, was dried in the sun. The analytical constants of the dried material are as follows: Total Nitrogon 4.06%, fat 6.16%, Ash 21.47%, Moisture 10 45%. Fat extraction was carried out with various solvents to see the efficiency of each solvent to remove fat. Acetone extracted more fat (about 9%) together with pigments, and petroleum ether extracted about 6% with less of pigments. The fat extracted with petroleum ether was analysed after decolorisation with activated carbon, and the results are given below: Saponification value 20.53, Iodine ualue 47.10, unsaponifiable matter 10.80%, free fatty acids 9.80%, peroxide value-Nil.

Preparation of cholesterol

The fat was saponified with N/2 alcoholic potassium hydroxide and the unsaponifiable matter was extracted with petroleum ether. The petroleum ether extract was decolorised by adding 1% activatvd carbon and keeping overnight. It was then filtered and the petroleum ether removed by distillation. Cholesterol was estimated in the residue by the Lieberman-Burchard reaction (Snell and Snell-1954). Of the unsaponifiable matter about 62% is cholesterol. The cholesterol was further purified by bromination as follows: (Fieser 1955) - one gram of crude cholesterol present in the unsaponifiable matter was dissolved in 7 ml. of ether bv slight warmimg. To this 5 ml. of bromine solution was added and shaken for sometime. It was cooled in ice. The crystallized dibromide

of cholesterol was filtered and washed free of bromine. It was transferred to a flask and 15 ml. of ether, 5 ml. of acetic acid and 0.2 gm. of zinc dust were added, shaken gently for 3 minutes and it was left at room temperature for sometime. It was decanted and the solution transferred to a separating funnel. The ether layer was washed free of acetic acid with successive quantities of dilute sodium hydroxide and water and finally washed with saturated sodium chloride solution. It was filtered through a filter paper containing anhydrous sodium sulphate. Methanol was added to the filtrate and concentrated on a water bath till crystals are formed. It was then cooled to room temperature and then in an ice-bath and the material was filtered and residue dried at 100°C.

The melting point of the cholesterol prepared was found to be 145°C. The purity of the compound was found to be about 94 percent when compared with standard curves obtained from pure cholesterol. The yield of cholesterol on the basis of fat is about 2%.

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