

was crystallized out using petroleum ether (b.p., 61-64°C.). The yield of the acid (iod. val., 0.4; sap. val., 186.5; and m.p., 79.6°C.) was 76 per cent on the weight of the product.

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## Preparation of Chitin & Glucosamine from Prawn Shell Waste

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**A process is reported for the recovery of chitin from prawn shell waste and its conversion to glucosamine hydrochloride. The yield of glucosamine hydrochloride obtained is about 10 per cent on the weight of the shell waste.**

**L**ARGE quantities of marine and backwater prawns are processed into a variety of products (dry prawn pulp, frozen headless, peeled and deveined, cooked frozen and semidried) for export. As a result of processing the prawns, large quantities of shells and other waste materials are left over which do not find any use at present. On an average about 500,000 lb. of such material is thrown into the sea every year. The shells contain chitin which, on hydrolysis, yields glucosamine useful in the treatment of tumours. The production of chitin from prawn shell waste and its conversion to glucosamine are described in this note.

Several samples of shell waste were collected from freezing factories, dried for 18 hr in the sun, pulverized and analysed according to the AOAC methods. For the determination of protein content, the method of Brown<sup>1</sup> was followed with the modification that for decalcification 5 per cent hydrochloric acid was used in place of formic acid. The proximate analyses of a shell waste sample prepared in the laboratory, a commercial sample and shells are presented in Table 1.

*Preparation of chitin* — To 100 g. of the sample, 1.5-2.0 litres of absolute acetone were added and the mixture refluxed for 45 min. to remove the pigments

TABLE 1 — ANALYSES OF PRAWN SHELL WASTE SAMPLES

	Sample I (laboratory prepared)	Sample II (commercial)	Sample III (shells only)
Moisture, %	14.06	12.93	9.24
Total ash, %	43.44	23.90	26.67
Insolubles, %	1.40	2.32	0.90
Soluble ash, %	42.04	21.58	25.77
Fat (dry basis), %	1.80	3.50	1.40
Total nitrogen (dry basis), %	8.33	10.20	9.85
Chitin nitrogen (dry basis), %	0.83	1.62	2.13
Protein (corr.), %	46.88	53.63	48.26
Calcium (as CaO), %	14.03	13.05	13.40
Phosphorus (as P <sub>2</sub> O <sub>5</sub> ), %	3.51	4.64	3.73
Chitin, %	10.00	27.40	30.00

and fatty material. The acetone was filtered off and the material treated with 70 per cent aqueous acetone and filtered. The residue was decalcified with 5 per cent hydrochloric acid by constantly stirring with 1.5-2.0 litres of the acid for 2 hr. The material was filtered under suction and washed thoroughly with water. The decalcified product was refluxed with 1.5-2.0 litres of 5 per cent sodium hydroxide for 2 hr to remove the proteins. The mixture was filtered under suction and the residue washed repeatedly with hot water. Chitin, obtained as a white residue, was finally dried *in vacuo*.

*Preparation of glucosamine hydrochloride* — To 15 g. of chitin, 100 ml. of concentrated hydrochloric acid was added and the mixture warmed over a water bath until the solution no longer gave opalescence on dilution with water. The excess acid was distilled off under vacuum. The crude glucosamine hydrochloride was diluted with water and clarified with activated charcoal. The solution was filtered and evaporated under vacuum. To the residue, 200 ml. of rectified spirit were added and the glucosamine hydrochloride was allowed to separate from the mother liquor. The hydrochloride was washed once with rectified spirit and dried in a vacuum desiccator. The yield of glucosamine hydrochloride was 10 per cent on the basis of the shell waste.

The product obtained was light brown in colour, highly soluble in water and insoluble in alcohol and chloroform. It had the following characteristics: nitrogen content, 6.35; ash content, negligible; m.p., >190°C. (decomp.); mol. wt, 103; dissociation in 1 per cent solution, 100 per cent. These data indicate that the product was pure glucosamine hydrochloride.

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