

Comparative Analysis of the Thermal Properties of Chitin of Marine Invertebrates

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Chitin is a linear polysaccharide composed of beta-(1 to 4)-2-deoxy-2-acetamido-D-glucopyranose repeating units. It is similar to cellulose in both its structure and abundance in nature. Chitin has protective and supporting biological functions. It is also an important component in the organic matrix of the exoskeletons of many invertebrate animals (insects, crustaceans, mollusks, corals, annelids, ectoprocts, and brachiopods), fungi, and bacteria. Chitin is also a material that is becoming important in the development of new materials. It is therefore important to study the crystalline structure, physical properties, and quantitative proportions of chitin available in different species, and, in particular, in marine species.

The object of the present work is to investigate chitin's thermal properties and its relationship to the microstructure of the exoskeleton of three species of marine invertebrates, *Antipathes caribbeana* (black coral), *Limulus poliphemus* (xiphosure), and *Callinectes sapidus* (crab).

The thermal properties are studied in flat samples using the open photoacoustic cell technique. The structural properties are analyzed using x-ray diffraction. Our results show that the thermal properties are strongly influenced by the species. It is shown that our results are related to the mesostructure as well as the microstructure of the material; in particular, the packing and distribution of the chitin fibers are important factors.