Kinetics of Thermooxidative Degradation of Selected Sponge Chitins

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Chitin as polysaccharide contains of glucopyranose units. Chemically it is structurally similar to cellulose; however, it is an amino polysaccharide possessing acetamide group at C-2 positions in place of hydroxyl group. Chitin is a strengthening element in the cell walls of most fungi, shells of crustaceans such as crabs and shrimps, cuticles of arthropods, exoskeletons of krill, element of insects, sponges as well as specific component of many other living organisms. It is a white, hard, inelastic, containing nitrogen material.

In this report the object of TGA analysis are α-chitins form see sponges according to the source below:

Sample A. aerophoba – α-chitin isolated from sponge Aplysina aerophoba,
Sample I. basta – α-chitin isolated from sponge Ianthella basta,
Sample A. cauliformis – α-chitin isolated from sponge Aplysina cauliformis,
Sample A. fulva – α-chitin isolated from sponge Aplysina fulva,
Sample V. rigida – α-chitin isolated from sponge Verongula rigida.

This degradation process appears in three stages. The studies performed in this work have shown that the basic range of the thermal degradation of α-chitins is 320–410°C. It was also presented, that the αs - αr method can be successfully used in the determination of the sequence of thermal resistance of chitins. In the main degradation step the thermal resistance depends on the origin of this biopolymer and can be marked as follows. Calculated activation energy values are from 40-70 kJ/mol depending of the chitin origin.

[1] Dawid Stawski: Thermogravimetric Analysis of Sponge Chitins in Thermooxidative Conditions, Chapter in monography: Extreme Biomimetics, editor: Hermann Ehrlich, Springer International Publishing, 2016