

Characterization of Ulvan - A Polysaccharide Extracted from *Ulva lactuca*

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Ulvan polysaccharide a polymer that is known to have bioactive potential was extracted from *Ulva lactuca*. The fine white powder whose yield was about 20% was characterized with respect to its biochemical and structural features. Carbohydrate-619 mg/g, uronic acid-59 mg/g and sulphated polysaccharides-33.8 mg/g were present at significant levels. Elemental analysis performed by combustion revealed the presence of nitrogen, carbon, hydrogen and sulphur at 1.5, 20.55, 3.23 and 9.07 % respectively. To assess the chemical structure of Ulvan, the extracted powder was analyzed by Fourier Transform Infrared Spectroscopy (FTIR). Thermal degradation and thermal transitions of the extracted compound were studied by Thermo Gravimetric Analysis (TGA) and Differential Scanning Calorimetry. Chemical characterization by elemental analysis and FTIR revealed that the extracted Ulvan is chemically similar to polysaccharides extracted from similar sources. A characteristic band at 3341.03 cm⁻¹ corresponding to -OH groups, which is consistent with the structure of disaccharides was observed. The occurrence of sulphur of more than 9% and the peak corresponding to sulphate ions in the IR-spectra confirm that the extracted Ulvan is a sulphated polysaccharide. Spectrophotometric determination also revealed occurrence of uronic acids. According to the thermogravimetric analysis ulvan was thermally stable until about 200 °C. Thermogram obtained by Differential Scanning Calorimetry exhibits a major transition at about 120 °C. This transition could be associated with loss of water, being consistent with the hydrophilic nature of Ulvan functional groups. Our DSC experiments allowed us to determine the Glass Transition Temperature (T_g), the temperature range where a thermosetting polymer changes from a hard, rigid or "glassy" state to a more pliable, compliant or "rubbery" state to be between 80 and 82 C. Nuclear Magnetic Resonance Imaging of the Ulvan showed characteristic peaks. All aromatic protons bound to -OH groups are in the region of 4.5 to 5.0. Protons attached to ether groups are allocated in the region of 3.4 to 3.6. Methyl protons of rhamnose are assigned in the region of 0.8 to 1.1.