

## Extraction, Synthesis, Characterization and Antioxidant Properties of Oxidized Starch from an Abundant Source in Nigeria

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**Abstract :** Starch has gained interest as a renewable and environmentally compatible polymer due to the increase in its use. However, starch by itself could not be satisfactorily applied in industrial processes due to some inherent disadvantages such as its hydrophilic character, poor mechanical properties, its inability to withstand processing conditions such as extreme temperatures, diverse pH, high shear rate, freeze-thaw variation and dimensional stability. The range of physical properties of parent starch can be enlarged by chemical modification which invariably enhances their use in a number of applications found in industrial processes and food manufacture. In this study, *Manihot esculentus* starch was subjected to modification by oxidation. Fourier Transmittance Infra- Red (FTIR) and Raman spectroscopies were used to confirm the synthesis while Scanning Electron Microscopy (SEM) and X- Ray Diffraction (XRD) were used to characterize the new polymer. DPPH (2, 2-diphenyl-1-picryl-hydrazyl-hydrate) free radical assay was used to determine the antioxidant property of the oxidized starch. Our results show that the modification had no significant effect on the foaming capacity as well as on the emulsion capacity. Scanning electron microscopy revealed that oxidation did not alter the predominantly circular-shaped starch granules, while the X-ray pattern of both starch, native and modified were similar. FTIR results revealed a new band at 3007 and 3283cm<sup>-1</sup>. Differential scanning calorimetry returned two new endothermic peaks in the oxidized starch with an improved gelation capacity and increased enthalpy of gelatinization. The IC<sub>50</sub> of oxidized starch was notably higher than that of the reference standard, ascorbic acid.

**Keywords :** antioxidant activity, DPPH, *M. esculentus*, oxidation, starch

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