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New Technique in Starch Nanoparticles Synthesis

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Highlights

- A new technique for the preparation of starch nanoparticles was adapted.
- The new technique is based on the dual effect of sodium hydroxide and glycerol.
- Combination between mechanical and chemical processes.
- FTIR, XRD, TGA and TEM were used to characterize the starch nanoparticles.
- Ease of the process and eco-friendly chemicals.
- Combination between the mechanical and the chemical processes.

Abstract

Starch nanoparticles (StNPs) were previously prepared using severe mechanical, physical and/or chemical conditions that takes too long time to produce a little yield of uncontrolled large size of StNP. The current work presents a new technique for the synthesis of StNPs based on the combination between sodium hydroxide and glycerol in aqueous medium during the synthesis process while the precipitation of the StNPs is performed under homogenization at ambient conditions. The new technique is based on three assumptions: 1) the dual impact of sodium hydroxide and glycerol on the swelling and gelatinization of starch as a pre-stage of the synthesis of (StNPs1), 2) the dual impact of glycerol and cooking of starch on the swelling and gelatinization of starch as a pre-stage of the formation of (StNPs2), and 3) the precipitation under homogenization at ambient conditions and its effect on breaking the H- bonds of the starch molecule in both StNPs1 and StNPs2. The importance of this technique arises from the ease of the process, the eco-friendly chemicals and the combination between the mechanical and chemical processes. NS (native starch), StNPs1 and StNPs2 were characterized using FTIR, XRD, TGA and

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