

Biodegradable films produced from ozone-modified potato starch

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Keywords: Biodegradable films, potato, starch, ozone.

Abstract

In the last decades, food packaging advances have led to increased constraints, mainly due to environmental issues, consumer health concerns, and economic restrictions associated therewith. The development of biodegradable alternatives is an important trend. Among the renewable sources, starch is a promising material for developing packages. However, the properties of native starches are limited. To overcome some of these limitations, native starches are usually modified. Ozone technology is an environmentally friendly technology, which is able to change both starch molecules size and charge. Consequently, new properties are achieved. In this study, biodegradable films were produced from starch modified by ozone technology.

Potato starch was ozonated in water suspension for different times (15 and 30 min). The films were produced by *casting* technique. A solution containing 5 g/100 g of potato starch, glycerol as the plasticizer (25 g /100 g of starch), and water as the solvent was prepared. The solution was poured (0.15 g/cm²) and then dried at 35 °C for ~ 12 h in a convective oven. Films were characterized in term of their mechanical (ASTM D882-09) and, functional properties – expressed in terms of contact angle (ASTM D7334 – 08), opacity and, morphology.

The properties of the film were a complex balance between the changes in the molecular size and the carbonyl and carboxyl groups content. Ozonation resulted in films with enhanced mechanical properties. Indeed, for the 30 min ozonated potato film the Young's Modulus increased in 42 % and the elongation at break reduced in 76 %, in comparison to the non-modified film. The contact angle increased from 31.5° to 60.7°, thus a more hydrophobic surface was achieved. Finally, films resulted less opaque with a reduction in the opacity of 75 %. In conclusion, the ozonated potato starch produced films which are a good alternative for packaging production.

Acknowledgements

FAPESP (2016/18052-5, 2017/05307-8, 2018/24291-8), CNPq (429043/2018-0, 306557/2017-7, 306414/2017-1), CAPES (001).