Semi-synthetic compounds as antimicrobial agents in food preservation

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In the last years, the number of papers describing new strategies to the synthesis and chemical modification of natural occurring compounds has exponentially increased. The synthesis of semi-synthetic compounds allows improving the biological activities presented by the natural, unmodified, molecules.

A class of substances of natural source that has been the target of several research groups in pharmaceutical and food sciences is the essential oils. This complex mixture of volatile compounds presents antimicrobial activity by disrupting the microorganism’s cell membrane, resulting in the inhibition of the electrons transport, affecting the protein translocation, the phosphorylation and other enzymatic activities, which causes the destruction of the cell membrane integrity, culminating with the microbial death.

Semi-synthetic compounds can be used as an alternative to the synthetic antimicrobial largely used by the food industries. These compounds can be directly added in the food or incorporated in the food packaging, affording an active package, where the diffusion of the antimicrobial agent from the package to the food surface occurs in a controlled mode. Alternatively, the active molecules can be adsorbed to the covering or films used in food. The final goal in using semi-synthetic compounds is to extend the shelf life and/or to ensure the food safety.

The use of natural occurring feedstock, such as essential oils and their constituents, in the synthesis of new semi-synthetic molecules is in agreement with the green chemistry. This is a new philosophy, which aims to minimize the collateral effects caused by the chemical activity to the environment.

In this chapter, we will discuss the synthesis, antimicrobial properties, mechanism of action and the applicability of semi-synthetic antimicrobials in food conservation. We have analyzed and critically discussed around 60 articles covering the last improvements on the field and some representative references are listed below.

Keywords green chemistry; microorganisms; food; antimicrobial; essential oil

References