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# Antimicrobial Properties of SEBS Compounds with Copper Microparticles

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**Abstract :** Indoor environments, such as car cabins and public transportation vehicles are places where users are subject to air quality. Microorganisms (bacteria, fungi, yeasts) enter these environments through windows, ventilation systems and may use the organic particles present as a growth substrate. In addition, atmospheric pollutants can act as potential carbon and nitrogen sources for some microorganisms. Compounds base SEBS copolymers, poly(styrene-b-(ethylene-co-butylene)-b-styrene, are a class of thermoplastic elastomers (TPEs), fully recyclable and largely used in automotive parts. Metals, such as cooper and silver, have biocidal activities and the production of the SEBS compounds by melting blending with these agents can be a good option for producing compounds for use in plastic parts of ventilation systems and automotive air-conditioning, in order to minimize the problems caused by growth of pathogenic microorganisms. In this sense, the aim of this work was to evaluate the effect of copper microparticles as antimicrobial agent in compositions based on SEBS/PP/oil/calcite. Copper microparticles were used in weight proportion of 0%, 1%, 2% and 4%. The compounds were prepared using a co-rotating double screw extruder (L/D ratio of 40/1 and 16 mm screw diameter). The processing parameters were 300 rpm of screw rotation rate, with a temperature profile between 150 to 190°C. SEBS based TPE compounds were injection molded. The compounds emission were characterized by gravimetric fogging test. Compounds were characterized by physical (density and staining by contact), mechanical (hardness and tension properties) and rheological properties (melt volume rate – MVR). Antibacterial properties were evaluated against Staphylococcus aureus (S. aureus) and Escherichia coli (E. coli) strains. To avaluate the abilities toward the fungi have been chosen Aspergillus niger (A. niger), Candida albicans (C. albicans), Cladosporium cladosporioides (C. cladosporioides) and Penicillium chrysogenum (P. chrysogenum). The results of biological tests showed a reduction on bacteria in up to 88% in E.coli and up to 93% in S. aureus. The tests with fungi showed no conclusive results because the sample without copper also demonstrated inhibition of the development of these microorganisms. The copper addition did not cause significant variations in mechanical properties, in the MVR and the emission behavior of the compounds. The density increases with the increment of copper in compounds.

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