

## Abstract

To investigate the effects of electron beam sterilization impact on the resistance of properties of PP-material, commercially available syringes with different electron irradiation doses (0, 1 and 15 kGy) were acceleratedly aged in an autoclave. Different exposure factors such as temperature, pressure and exposure medium were considered in more detail. During the aging process, samples were examined attended mainly with the tensile test, DSC, FTIR and TDS-GC/MS. All factors are relevant for aging behavior and, with the exception of exposure medium; all factors accelerate this process with increasing intensity. Degraded antioxidants can still act as antioxidants. The phenol derivatives, opposed to the spiro derivatives, perform better as migrants. During the degradation time in wet exposure, the oxidized surface is washed off or dissolved. For a realistic accelerated aging in an autoclave there should be an exposure temperature of  $T_L \leq 80 \text{ }^\circ\text{C}$ , an exposure pressure of  $p_L \leq 10 \text{ bar}$ , and a radiation dose as low as possible, so both the intact and degraded antioxidants are present in the material. Additionally an exposure medium which is most similar to the real application should be used. With the TDS-GC/MS method it is possible to draw conclusions about the failure or rather on the achievement of service time. In addition, the microscopic changes caused by steam sterilization were examined. It turned out that the first DSC heating curve may serve as evidence for prior steam sterilization of polyolefines. Furthermore the volatility of small PA 6 molecules during sterilization processes (steam and EO sterilization) was examined and confirmed.