

Quantifying the release of polymer additives from single-use materials by respiration activity monitoring

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Abstract

Single-use technologies, and thereby polymer materials, are increasingly applied in laboratory and large-scale fermentations. However, little is known about how leaching of polymer additives may affect the culture and compromise GMP regulations. The aim of this study is to introduce a standardized analytical device to test the biocompatibility of such polymer materials. The breathing behavior of various microorganisms was determined with the Respiration Activity Monitoring Systems (RAMOS) as a function of the added amount of polymer commonly applied in biotechnology. Nylon and polyamide 12, used in cable ties and tubing, respectively, were found to delay and inhibit microbial growth. This is caused by leaching of the plasticizer N-butylbenzenesulfonamide and monomer 1,8-diazacyclotetradecane-2,7-dione, respectively, from the polymers. A metabolic activity inhibition threshold concentration between 4–10 g/L was determined for polyamide 12 tubing. In conclusion, RAMOS is a sensitive and time-effective device to qualify materials before they are applied in cultures.

Involved units

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