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Rapid Evaluation of Oxygen and Water Permeation through Microplate Sealing Tapes

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Abstract:

Eight commercially available microplate sealing tapes and 10 other suitable materials (transparent wound dressings) are compared qualitatively in terms of their ability to minimize water evaporation from a multiwell plate while maintaining the oxygen supply as high as possible, which is necessary for applications like aerobic growth. The transparency and sterility of the products are considered as well. All evaluated commercially available sealing tapes fall into one of the following two classes: (1) O_2 transfer is comparable to that of an unsealed plate, but water vapor retention is relatively low, or (2) O_2 transfer via the sealing is slower, but the water retention capability is comparably high. All but one of the evaluated wound dressings fall under the second class. That dressing, however, constitutes a compromise by showing both moderate O_2 permeability and medium water retention. But the estimated mass transport in a microtiter plate sealed with this dressing is about 5 times slower than that of an unsealed 96 well plate. The aim of this publication is to enable the reader to choose a microtiter plate sealing from the materials evaluated within this work and to use the rapid methods described herein to easily perform tests of additional sealing materials.