# A New Device to Select Microcarriers for Biomass Immobilization: Application to an Anaerobic Consortium

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Sand is the most widely used microcarrier in fluidised bed reactors[1]. However, the choice of sand is found to be far from the optimum, as far as biomass retention capacity is concerned. Other materials have been evaluated, such as granular activated carbon[2] foam glass[3] sepiolite, pozzolana[5] diatomaceous earth[4] or pumice stone. The use of porous microcarriers reduced the start-up time by more than 50% as compared to sand[3], allowed the application of higher organic loading rates and favoured the biofilm growth[2]. So far the comparative studies of different microcarriers for biomass colonisation have been made either in continuous mode, operating one reactor with each support[2, 4] or in batch tests run simultaneously[6]. In this work a new device to compare biomass retention capacity of different microcarriers was designed. The microcarriers are randomly distributed in parallel mini-bioreactors under selected and identical flow conditions. Four porous microcarriers (sepiolite, pozzolana, clay and foam glass (Poraver™ )) were compared in terms of their ability to retain an anaerobic consortium developed in a synthetic dairy waste. Sepiolite was found to have the highest biomass retention capacity and the better internal porous volume for biomass immobilisation (Table 1). The average specific methanogenic activity (SMA) of the immobilised biomass in the different support materials was found to be inversely correlated to the amount of attached biomass (Figure 1). The individual acetate propionate and butyrate consumption rates revealed that acetoclastic bacteria were the most inhibited by the immobilization whereas syntrophic activity was enhanced for all the materials. Internal diffusion limitations, potential stimulation/inhibition of released components from the different materials and the more suitable hydrogen environment in the biofilm can be put forward to explain these observations.

Table 1 - Attached biomass concentration, expressed per internal porous volume (±95% confidence interval).

| Material | Attached biomass g VS/L (internal porous volume) |
|---|---|
| sepiolite | 38.4±2.4 |
| clay | 35.1±1.0 |
| pozzolana | 29.3±1.3 |
| foam glass | 19.3±1.4 |

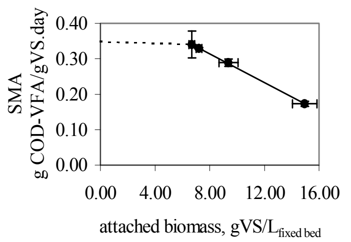


Figure 1. SMA of the attached biomass. Extrapolated value represents non attached biomass activity.

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