Parametric studies of polymethacrylate-based monolith fabrication

ABSTRACT

Polymethacrylate monoliths (PM) have interconnected pores that allow physical form of filtration whereby particles that are smaller than the pore size can flow through while particles that are larger than the pore size are unable to pass through. The size of the pores determines the effectiveness of PM in filtering certain particles. Larger pore size means more void spaces within the structure of a monolith which affects its mechanical strength. Besides that, pore size also affects the flow rate and energy required to push a liquid sample through for filtration. Therefore, information regarding parameters that affect the pore size formation of a fully polymerized PM is important not only for the targeted particle size, but also for the structural strength and operating energy requirement of the intended filters. Among the parameters investigated were thickness of monolith, percentage of porogen, percentage of initiator and polymerization temperature. Higher polymerization temperature yield PM with smaller pore size. The increase of percentage initiator and porogen used were observed to increase the pore size of the PM formed. Finally, the pore size of PM becomes bigger as the monolith becomes thicker (observed from 1 mm to 5 mm thickness).