

Quiz 3 (50 mins)

Quiz Rules

1. You are expected to abide by highest standards of academic honesty. You have been apprised of it during the first lecture.
 2. State the assumptions made very clearly.
 3. You are allowed to carry calculator and pen.
 4. *Above all, read the question carefully.*
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1. [100 points] Consider an idealized conical pore (truncated, as shown in figure below) for which you are required to develop a differential equation for mass transfer limitation. Assume that the reaction is taking place on the pore wall and is first-order (neglect adsorption/desorption steps). No reaction takes place at the pore end and isothermal-isobaric conditions are maintained inside the pore. Also, assume there are no radial gradients of concentration. Apply mole balance on a small element (a thickness of Δx) and develop a non-dimensionalized differential equation for the truncated conical pore geometry. To earn full points you will also need to mention the boundary conditions with proper justification.

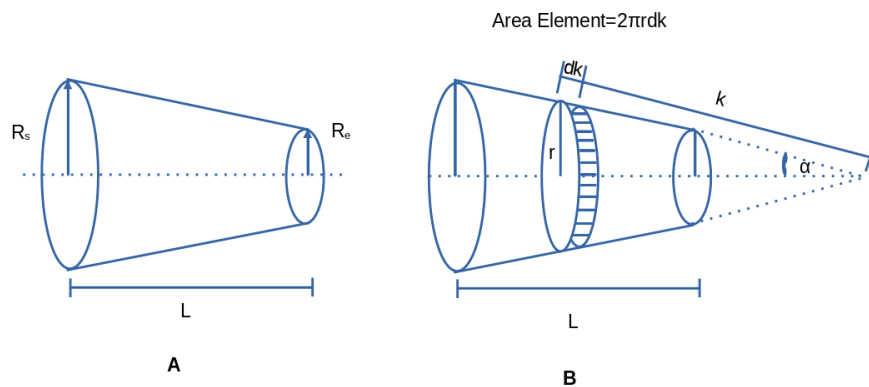


Figure 1: Dimensions of the truncated conical pore.