

Unit 34. Pre-Class Quiz Questions

1. Which of the following situations is likely to require using a two- or three-dimension tubular reactor model (choose all that apply)?
 - a. isothermal reaction of an aqueous solution
 - b. highly exothermic reaction where the reactor is cooled through the walls
 - c. creeping flow catalytic reaction
 - d. endothermic reaction with reactor tubes passing through a furnace
 - e. stirred tank with poor agitation
2. In the 2-D tubular reactor model from Unit 34, the superficial velocity
 - a. equals one-third of the interstitial velocity
 - b. is a function of the radial position
 - c. may be a function of axial position
 - d. equals the volumetric flow rate divided by the fraction of the tube cross-sectional area that isn't blocked by catalyst particles
 - e. equals the speed at which fluid bypasses the catalytic packed bed
3. Effective transport properties
 - a. are equal to the molecular diffusivity and thermal conductivity
 - b. account for radial mixing due to both flow and molecular phenomena
 - c. are needed whenever there is a superficial velocity
 - d. apply in the random pore model
 - e. become important whenever the void fraction of the packed bed is greater than 0.44
4. True or false? The effective diffusion coefficient accounts for the fact that the actual diffusion does not occur in a straight line in the radial direction.
5. True or false? In the ideal plug flow reactor energy balance the heat transfer term appears in the boundary conditions while it appears directly in the balance equation for a 2-D pseudo-homogeneous reactor model.