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NPTEL

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Courses » Transport Phenomena of Non-Newtonian Fluids

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Unit 11 - Week 9: Mass Transfer Phenomena of Non-Newtonian Fluids

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Course outline

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Week 1: Introduction of Non-Newtonian Fluids

Week 2: Rheology Measuring Instruments

Week 3: Equations of Change

Week 4: Momentum Transfer of Non-Newtonian Fluids

Week 5: Momentum Transfer of Non-Newtonian Fluids

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Week 09 Assignment 01

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2019-04-03, 23:59 IST.

1) Consider a binary gaseous system of A and B at constant temperature and pressure of 300K and 1atm, respectively, in a pipe of length 25cm. Diffusivity of this system is 7.86×10^{-4} m^2/s. At one end of the pipe, the partial pressure of A is 0.60atm and at the other end it is 0.20atm. What is the molar flux of A at steady state conditions in $kmol/m^2.s$? ***10 points***

- 7.45×10^{-7}
- 2.36×10^{-6}
- 5.11×10^{-5}
- 8.72×10^{-4}

No, the answer is incorrect.
Score: 0

Accepted Answers:
5.11×10^{-5}

2) Consider a liquid A filled in a column of height 13cm, where the distance from liquid level to top of the column is 11.14cm. Component A is evaporating into a stagnant air B at a total pressure of 770 mmHg and temperature of 25°C. The diffusivity of the system is $0.088cm^2/s$. Vapour pressure of A is 23.81 mmHg. Density of A is 1.65g/cc and surface area of liquid exposed for evaporation is $2.29cm^2$. What is the rate of evaporation in g/hr, if the molecular weight of component A is 164.4 g/g-mol? ***15 points***

- 0.924
- 0.014
- 0.438
- 0.276

No, the answer is incorrect.
Score: 0

Accepted Answers:

- 0.274
- 0.765
- 1.672
- 3. 27

No, the answer is incorrect.
Score: 0

Accepted Answers:
0.274

4) Consider a gas-liquid system in spherical geometry by considering droplet of liquid A, of radius r_1, is being suspended in a stream of gas B. There exists a spherical stagnant gas film (of component B) of radius r_2 surrounding the liquid droplet. The concentrations of A in gas phase at these two locations are x_{A1} and x_{A2}. What is the flux of A at the droplet surface, i.e., at $r = r_1$? ***15 points***

No, the answer is incorrect.
Score: 0

Accepted Answers:

5) Consider leaching of a substance “A” from solid particles by using a solvent “B” assuming that the rate controlling step is diffusion of A from solid particle surface through a stagnant liquid film of thickness δ and then into main liquid stream consisting of A and B. Saturation solubility of A in solvent B is C_{A0} and concentration of A in main liquid stream is $C_{A\delta}$. Assume slab like particle with surface designated as z = 0 for geometrical simplicity. What is rate of leaching of A at surface of particle, i.e., at z = 0? ***15 points***

No, the answer is incorrect.
Score: 0

Accepted Answers:

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