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mass transfer is the net movement of mass from one location usually meaning stream phase fraction or component to another mass transfer occurs in many processes such as absorption evaporation drying precipitation membrane filtration and distillation

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mass transfer models help us understand how we can manipulate the process to reach equilibrium in a faster or more economical manner this chapter will briefly review fundamentals of mass transfer in gas liquid systems because many of the separation processes in this handbook involve the movement of species between gas and liquid phases

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mass transfer definitions and fundamental equations multicomponent systems mass transfer mass transfer deals with situations in which there is more than one component present in a system for instance situations involving chemical reactions dissolution or mixing phenomena

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mass transfer in gas liquid systems in chemical separations we can use thermodynamic models to predict the composition in each phase at equilibrium for example raoult s law describes the compositions of

vapor and liquid phases at equilibrium mass transfer models help us understand how we can manipulate the process to reach equilibrium in

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mass transfer by convection involves the transport of material between a boundary surface such as solid or liquid surface and a moving fluid or between two relatively immiscible moving fluids don t confuse this phenomenon with the movement of mass caused by a chemical species simply being carried along in a fluid stream advection

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mass transfer occurs by two basic mechanisms molecular diffusion and convection analogous to the conduction and convection modes of heat

transfer mass transfer by molecular diffusion driven by a concentration gradient results in net transport of molecular mass occurs from a region of high concentration to an area of low concentration by a

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what is mass transfer fluid flow heat transfer and mass transport mass transfer understanding mass transfer mass transfer describes the transport of mass from one point to another and is one of the main pillars in the subject of transport phenomena mass transfer may take place in a single phase or over phase boundaries in multiphase systems

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depending on the conditions the nature and the forces responsible for

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mass transfer four basic types are distinguished 1 diffusion in a quiescent medium 2 mass transfer in laminar flow 3 mass transfer in the turbulent flow and 4 mass exchange between phases

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transient conduction and diffusion radiative heat transfer convective transport of heat and mass in both laminar and turbulent flows emphasis on the development of a physical understanding of the underlying phenomena and upon the ability to solve real heat and mass show more

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this chapter introduces fundamental mass transfer concepts through the modeling of the evaporation process that takes place at the free surface of a mug of coffee

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new developments in the field of basic research of heat and mass transfer phenomena covers the complete discipline of heat and mass transfer in relation to engineering thermodynamics and fluid mechanics and to transport phenoma of heat and mass in all technical applications

principles of mass transfer introduction when a component in

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mass transfer when a component in a mixture migrates in the same phase or from phase to phase because of a difference in concentration examples of mass transfer evaporation of water in the open pail to the atmosphere coffee dissolves in water oxygen dissolves in the solution to the microorganism in the fermentation process

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faith a morrison michigan tech u encompasses all mass transfer mechanisms random motion convection thermodynamics driven specific interaction controls the cost of processes like chemical purification and environmental control is practical is basic to the engineering of chemical processes is also slow

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an analogous equation can be written in heat transfer for the steady heat conduction equation given by div Φ where Φ is the rate of production of heat instead of mass these two equations have particular

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value since they do not rely on fick s or fourier s laws and the assumptions that underlie them

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mass transfer coefficient units mol s m 2 mol m 3 m s note the units will vary based upon which units the driving force is expressed in the driving force shown here as is expressed in units of moles per unit of volume but in some cases the driving force is represented by other measures of concentration with different units

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mass transfer operations are concerned with the transfer of matter from one stream to another in many processes a change in phase may also be involved some typical mass transfer processes are shown in

table 13 1

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explain the relationship between mass transfer and phase equilibrium explain why separation models for mass transfer and phase equilibrium are useful discuss mechanisms of mass transfer including the effect of bulk flow

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there are three basic mechanisms of mass transport diffusion defined as the spontaneous movement of any material from where it is to where it is not migration the movement of charged particles in an electric field convection movement of material contained within a volume

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