Chapter 11
Mass Transfer in Fluids

Abstract

This chapter examines the transport of species in a fluid mixture, first with use of a film model. This approach treats mass moving from a liquid or solid surface to a well-mixed region beyond the film, which lies in between. Heat can affect composition transport by absorbing enthalpy during evaporation or because enthalpy moves with a mass flux. The local mass transfer coefficient at a solid-fluid interface is defined in a manner analogous to that used to define the local heat transfer coefficient. The mass flux is proportional to the difference between the mass densities of the fluid at the surface and in the bulk fluid beyond the boundary layer, with the mass transfer coefficient being the proportionality constant. This analogy leads to the definition of the Sherwood number and the Schmid number, and, in forced convection, mass transport is modeled with the same correlations as heat transfer correlations and analyses, except with the replacement of Nu and Pr with Sh and Sc.