Chemical Engineering 150B First Midterm Review Sheet

|  |  |
| --- | --- |
| Liquid or solid mixture | Gas mixture |
|  |  |

**Fick’s law for molecular diffusion**

**Equimolar counterdiffusion in gases**

**Convection**

**If A is diffusing in stagnant, nondiffusing B,**

**Diffusion from a sphere**

**Diffusion through a conduit of nonuniform cross-sectional area**

Equation for diffusion in liquids

**Diffusion in solids**

|  |  |
| --- | --- |
| Heat transfer | Mass transfer |
|  |  |



Initial conditions (IC)

Boundary conditions (BC)

Boundary conditions (BC)

Sherwood number

Different types of fluxes

|  |  |  |
| --- | --- | --- |
|  | Mass flux (kg/s/m^2) | Molar flux (kg/s/m^2) |
| Relative to fixed coordinates |  |  |
| Relative to molar average velocity vm |  |  |
| Relative to mass average velocity v |  |  |
| Relations between the fluxes above |
|  |  |  |
|  |  |  |
|  |  |  |

General mole balance

**Spherical coordinates** (typical 1D transport)

If dilute or if counterdiffusive

If no reaction,

If steady state with reaction, if steady state without reaction,

Typical ICs, t=0,

Typical BCs, r=R,

Cartesian coordinates (can be any dimension)

If dilute or if counterdiffusive

If no reaction,

If steady state with reaction, if steady state without reaction,

Typical ICs, t=0,

Typical BCs, z=something,

Cylindrical coordinates (can be 1D radial, or 2D axial)

If no reaction,

If steady state with reaction, if steady state without reaction,

Typical ICs, t=0,

Typical BCs, z or r=something,