



What is the  $C$  of a trace element in each phase?

$C_0$  = Concentration in the whole system

$C_S$  =  $C$  in S phase

$C_L$  =  $C$  in L phase

Function of  $D$ ... and  $F$  (% melt)

Consider  $D = 0$  (perfectly incompatible)

if  $C_0 = 1$ , then at  $F = 0.5$   $C_L = 2$ , what about  $F = 0.1$  (10% melt)

Can you derive an equation for  $\frac{C_L}{C_0}$ ?

Conservation of Mass

$$C_0 M_0 = C_L M_L + C_S M_S$$

$$C_0 M_0 = C_L M_L + D C_L M_S$$

$$C_0 = C_L \frac{M_L}{M_0} + D C_L \frac{M_S}{M_0}$$

$$C_0 = C_L F + D C_L (1 - F)$$

$$\frac{C_L}{C_0} = \frac{1}{F + D(1 - F)} \quad \text{or}$$

$$\frac{C_S}{C_0} = \frac{D}{F + D(1 - F)}$$

$$D = \frac{C_S}{C_L} \quad F = \frac{M_L}{M_0}$$

$$(1 - F) = \frac{M_S}{M_0}$$

"Batch" crystallization = "Batch" melting