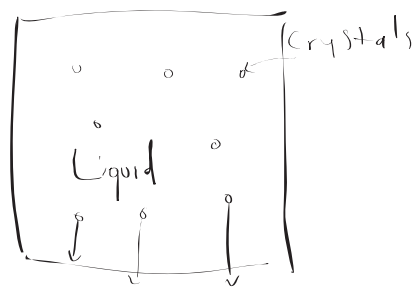


Fractional Crystallization



open system

are these the same?
open system, so pathway matters!

Example:

1% melt recrystallized

Will not have the original composition

"Batch" equilibrium where melt \longleftrightarrow crystallization

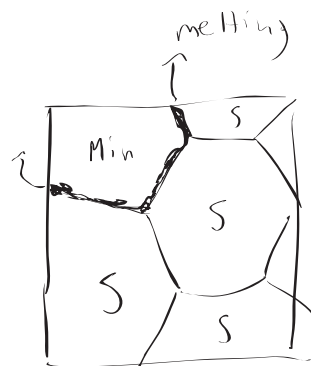
Derivation is similar, set $-dM_m = dM_s$

rate of change of element loss by melt = change of mass of element in solid extraction

$$-C_m dM_m = d(C_s M_s)$$

→ similar steps as before

Fractional melting



open system

$$\int dM_m$$

M_{s0} = Mass of solid initially

M_s = Mass of solid

dM_m = melt increment

$$M_m = \int dM_m \text{ Total melt}$$

$$(1-F) = \frac{M_s}{M_{s0}}$$

C_s = conc. in solid

C_m = conc. in melt

C_{s0} = conc. in solid initially

Fractional melting

$$\frac{C_s}{C_{s0}} = (1-F)^{\frac{1}{D}-1}$$

$$\text{or}$$

$$\frac{C_m}{C_{s0}} = \frac{1}{D} (1-F)^{\frac{1}{D}-1}$$

instantaneous melt