$$\frac{X_i^{\phi}}{X_n^{\phi}} = \frac{X_i^{B}}{X_n^{B}} \exp\left(-\Delta G_{seg}/RT\right)$$

$$X_i^{\phi} X_n^{B} = X_n^{\phi} X_i^{B} \exp\left(-\Delta G_{seg}/RT\right)$$

$$\sum_{i=1}^{n-1} X_i^{\phi} X_n^{B} = \sum_{j=1}^{n-1} X_n^{\phi} X_j^{B} \exp\left(-\Delta G_{seg,j}/RT\right)$$

$$\frac{X_n^{B}}{X_n^{\phi}} = \frac{\sum_{j=1}^{n-1} X_j^{B} \exp\left(-\Delta G_{seg,j}/RT\right)}{\sum_{i=1}^{n-1} X_i^{\phi}} = \frac{\sum_{j=1}^{n-1} X_j^{B} \exp\left(-\Delta G_{seg,j}/RT\right)}{1 - X_n^{\phi}}$$

$$X_i^{\phi} = X_i^{B} \cdot \frac{X_n^{\phi}}{X_n^{B}} \cdot \exp\left(-\Delta G_{seg}/RT\right) = X_i^{B} \exp\left(-\Delta G_{seg}/RT\right) \cdot \frac{1 - X_n^{\phi}}{\sum_{j=1}^{n-1} X_j^{B} \exp\left(-\Delta G_j/RT\right)}$$

$$= \frac{X_i^{B} \exp\left(-\Delta G_{seg}/RT\right) - X_i^{B} X_n^{\phi} \exp\left(-\Delta G_{seg}/RT\right)}{\sum_{j=1}^{n-1} X_j^{B} \exp\left(-\Delta G_j/RT\right)}$$

by $X_i^{B} X_n^{\phi} = X_i^{\phi} X_n^{B} \exp\left(\Delta G_{seg}/RT\right)$,

$$X_i^{\phi} = \frac{X_i^{B} \exp\left(-\Delta G_{seg}/RT\right) - X_i^{\phi} X_n^{B}}{\sum_{j=1}^{n-1} X_j^{B} \exp\left(-\Delta G_j/RT\right)}$$

$$X_i^{\phi}\left(1 + \frac{X_n^{B}}{\sum_{j=1}^{n-1} X_j^{B} \exp\left(-\Delta G_j/RT\right)}\right) = \frac{X_i^{B} \exp\left(-\Delta G_{seg}/RT\right)}{\sum_{j=1}^{n-1} X_j^{B} \exp\left(-\Delta G_j/RT\right)}$$