

### EXAMPLE 6.1

ORIGIN := 1

$$T := 373$$

$$R := 83.14$$

$$V_{C1} := 145.5$$

$$V_{C2} := 255$$

$$T_C := \begin{pmatrix} 305.3 \\ 425 \end{pmatrix}$$

$$P_C := \begin{pmatrix} 49 \\ 38 \end{pmatrix}$$

$$\omega := \begin{pmatrix} 0.099 \\ 0.199 \end{pmatrix}$$

$$V_C := \begin{pmatrix} 145.5 \\ 255 \end{pmatrix}$$

$$i := 1..2$$

$$j := 1..2$$

$$T_{r_i} := \frac{T}{T_{C_i}}$$

$$B_{0i} := 0.083 - \frac{0.422}{(T_{r_i})^{1.6}}$$

$$B_{1i} := 0.139 - \frac{0.172}{(T_{r_i})^{4.2}}$$

$$B_{i,j} := \frac{R \cdot T_{C_i}}{P_{C_i}} \cdot (B_{0i} + \omega_i \cdot B_{1i})$$

### Calculation of the cross second virial coefficient

$$k := 1 - \frac{8 \cdot \sqrt{V_{C1} \cdot V_{C2}}}{\left[ \left( V_{C1} \right)^{\frac{1}{3}} + \left( V_{C2} \right)^{\frac{1}{3}} \right]^3} = 0.013$$

$$T_{C12} := (1 - k) \cdot \sqrt{T_{C1} \cdot T_{C2}}$$

$$\omega_{12} := \frac{\omega_1 + \omega_2}{2}$$

$$P_{C12} := \frac{4 \cdot T_{C12}}{\left[ \left( V_{C1} \right)^{\frac{1}{3}} + \left( V_{C2} \right)^{\frac{1}{3}} \right]^3} \cdot \left( \frac{P_{C1} \cdot V_{C1}}{T_{C1}} + \frac{P_{C2} \cdot V_{C2}}{T_{C2}} \right) = 42.038$$

$$B_{120} := 0.083 - \frac{0.422}{\left(\frac{T}{T_{c12}}\right)^{1.6}}$$

$$B_{121} := 0.139 - \frac{0.172}{\left(\frac{T}{T_{c12}}\right)^{4.2}}$$

$$B_{1,2} := \frac{R \cdot T_{c12}}{P_{c12}} \cdot (B_{120} + \omega_{12} \cdot B_{121}) = -216.601$$

### Calculation of Bmix

$$B_{2,1} := B_{1,2}$$

$$y_1 := \frac{3}{8} \quad y_2 := \frac{5}{8}$$

$$B_{\text{mix}} := \sum_i \left[ \sum_j (y_i \cdot y_j \cdot B_{i,j}) \right] = -287.52$$