Koligativna svojstva

Tlak para otapala

• A(l) ⇄ A(g)

$$p_A = p_A^* x_A \qquad \Delta p_A = p_A^* - p_A = p_A^* x_B$$

$$p_A = p_A^* (1 - x_B)$$

Talište otopine

A(s) ⇄ A(l)

$-\mu(s) + \mu(l) = 0$

$\mu^\circ(l) + RT_f \ln x_l = \mu^\circ(s) + RT_f \ln x_s$

$-RT_f \ln x_l = \mu^\circ(l) - \mu^\circ(s) =$
$= \Delta_{fus}G^\circ = \Delta_{fus}H^\circ - T_f\Delta_{fus}S^\circ$

$$T_f = \frac{\Delta_{fus}H^\circ}{\Delta_{fus}S^\circ - R\ln x_l}$$

$$T_f^* = \frac{\Delta_{fus}H^\circ}{\Delta_{fus}S^\circ}$$

$$\Delta T_f = T_f^* - T_f = K_f \sum_i b_i$$

krioskopska konstanta

$$K_f = \frac{M_A R T_f^{*2}}{\Delta_{fus}H^\circ}$$

krioskopska konstanta

$$M_B = \frac{K_f m_B}{\Delta T_f \, m_A}$$

određivanje molarne mase otopljene tvari krioskopijom

Vrelište otopine

$$\Delta T_b = T_b - T_b^* = K_b \sum_i b_i$$

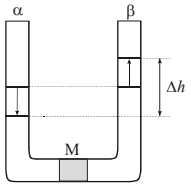
$$K_b = \frac{M_A R T_b^{*2}}{\Delta_{vap}H^\circ}$$

ebulioskopska konstanta

$$M_B = \frac{K_b m_B}{\Delta T_b \, m_A}$$

određivanje molarne mase otopljene tvari ebulioskopijom

osmotski tlak



osmotski tlak

Osmotska ravnoteža: $\mu_A^*(p^\alpha) = \mu_A(p^\beta, c_B)$

$-RT \ln x_A^\beta = \Pi V_{m,A}$

$x_B = 1 - x_A \qquad \ln(1-x) \approx -x$

$RT\, x_B = \Pi V_{m,A}$

osmotski tlak

$x_B = \dfrac{n_B}{n_A + n_B} \approx \dfrac{n_B}{n_A}$

$V_{A,m} = V / n_A$

$\Pi = c_B RT$

$$M_B = \frac{RTm_B}{\Pi V} = \frac{RT}{\Pi}\gamma_B$$

osmometrijsko određivanje molarne mase tvari B