Methods of Reactivity Ratio Evaluation

Several methods exist for evaluation of monomer reactivity ratios from experimental data [13-19]. Some of these methods utilized in the present work are:

a) Fineman – Ross method [13]

Equation (2) can be rearranged as

$$\frac{M_1(m_2 - m_1)}{M_2 m_1} = \left[\frac{-m_2 M_1^2}{m_1 M_2^2}\right] r_1 + r_2$$

A plot of $\frac{M_1(m_2 - m_1)}{M_2 m_1} vs \left[\frac{-m_2 M_1^2}{m_1 M_2^2}\right]$ gives a straight line whose slope is r_1 and intercept r_2.

b) Kelen – Tudos method [14]

Based on equation (1) an improved graphical method has been developed by Kelen – Tudos.

$$\eta = \left[r_1 + \frac{r_2}{\alpha}\right]\xi - \frac{r_2}{\alpha}$$

where $\eta = \frac{G}{\alpha + F}$ and $\xi = \frac{F}{\alpha + F}$

$$F = \frac{x^2}{y} \text{ and } G = \frac{x(y-1)}{y}$$

$$x = \frac{M_1}{M_2} \text{ and } y = \frac{m_1}{m_2}$$

M_1 and M_2 are the molar concentrations in the feed and m_1 and m_2 are the molar concentrations in the copolymer.

$$\alpha = \sqrt{F_M . F_m}$$

F_M = maximum mole ratio in copolymer
F_m = minimum mole ratio in copolymer

Plot of η values versus ξ after extrapolation to $\xi = 0$ and $\xi = 1$, gives $-r_2/\alpha$ and r_1 respectively, both as intercepts.