Page 179, equation (4.148) on page 177

A slightly modified proof[1] of (4.148) is given using the definition of chemical potential (4.161). The entropy inequality is modified using (4.159), $(4.161)_2$, (4.150), and (4.149). Further, let us fix the nonzero vector $\mathbf{u}_\beta$ and scalar tr$\mathbf{D}_\gamma$ for some constituents β and γ ($\beta, \gamma \in (1, \ldots, n)$) and substitute these terms with $\lambda \mathbf{u}_\beta$ and $\lambda \mathrm{tr}\mathbf{D}_\gamma$ in the entropy inequality. The parameter λ is a real number and all other $\mathbf{u}_\varepsilon, \mathrm{tr}\mathbf{D}_\varepsilon$ are selected to be zeros. Finally, T, ρ_ε are selected arbitrarily but fixed, and $\mathbf{g}$ and $\overset{\circ}{\mathbf{D}}_\varepsilon$ are set to zero ($\mathbf{g} = \mathbf{o}$ and $\overset{\circ}{\mathbf{D}}_\varepsilon = \mathbf{0}$) for all subscripts $\varepsilon = 1, \ldots, n$. In this way, the entropy inequality is modified to:

$$-\sum_{\psi=1}^{n-1}(g_\psi - g_n)r_\psi^{(0)} + \lambda \left[\rho_\gamma(g_\gamma - f_\gamma) - \sum_{\psi=1}^{n-1}(g_\psi - g_n)r_\psi^{(\gamma)} - p_\gamma\right]\mathrm{tr}\mathbf{D}_\gamma +$$
$$+\lambda^2\left[\zeta_{\gamma\gamma}(\mathrm{tr}\mathbf{D}_\gamma)^2 + (\nu_{\beta\beta} - \tfrac{1}{2}r_\beta^{(0)})\mathbf{u}_\beta^2\right] - \lambda^3\left[\tfrac{1}{2}r_\beta^{(\gamma)}\mathbf{u}_\beta^2\mathrm{tr}\mathbf{D}_\gamma\right] \geq 0.$$

This inequality should be valid for arbitrary values of the real parameter λ, the other quantities being constant. At sufficiently high values of λ, the last (cubic) term predominates. This term can have an arbitrary sign; therefore, the expression in it (in brackets) must be zero. This is valid for arbitrary tr$\mathbf{D}_\gamma$, arbitrary $\mathbf{u}_\beta$ and also the arbitrary indexes γ, β. From this (4.148) follows for arbitrary $T, \rho_1, \ldots, \rho_n$.

[1] following the book Samohýl I. *Rational thermodynamics of chemically reacting mixtures.* Praha: Academia 1982 (in Czech).