$$
\begin{aligned}
G(T, p, n_i^{\phi}) &= \sum \mu_i^{\phi}(T, p, n_i^{\phi}) n_i^{\phi} \\
&= \sum \left\{ \mu_i^{\circ\phi}(T) + RT \ln \frac{n_i^{\phi}}{\sum n_i^{\phi}} + \alpha RT \ln \frac{p}{p_0} \right\} n_i^{\phi}
\end{aligned}
$$