p = 
$$\frac{1}{\chi} \left( 1 + \alpha T_1 - \frac{V}{V_0} \right)$$
  
2. 
$$p = \frac{T_1 \alpha}{\chi} e^{\alpha \frac{V_2 - V}{C_V \chi}} + \frac{V_0 - V}{\chi V_0}$$
4. 3.