Affinity for Spontaneous Reaction; General Differential

A given closed system is prepared using \( n_i^0 \) moles of each chemical substance \( i \). At extent of chemical reaction \( \xi \) the ratio \( (A/T) \) where \( A \) is the affinity for spontaneous chemical reaction is defined by independent variables, \( T \), \( p \) and \( \xi \).

\[
(A/T) = (A/T) [T, p, \xi] \quad (a)
\]

The general differential of this equation has the following form.[1]

\[
d(A/T) = \left[ \frac{\partial (A/T)}{\partial T} \right]_{p, \xi} \cdot dT + \frac{1}{T} \left[ \frac{\partial A}{\partial p} \right]_{T, \xi} \cdot dp + \frac{1}{T} \left[ \frac{\partial A}{\partial \xi} \right]_{T, p} \cdot d\xi \quad (b)
\]

Footnote

[1] Equation (b) forms the basis of equations describing the dependence of \( A \) on \( T \) at fixed \( p \) and on \( p \) at fixed \( T \).