



SDI Review Form 1.6

Journal Name:	Physical Science International Journal
Manuscript Number:	Ms_PSIJ_41102
Title of the Manuscript:	Identity that Connects Thermal Expansion and Isothermal Compressibility is Not an Identity for Condensed Phases
Type of the Article	Short Research Article

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This journal's peer review policy states that **NO** manuscript should be rejected only on the basis of '**lack of Novelty**', provided the manuscript is scientifically robust and technically sound.

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PART 1: Review Comments

	Reviewer's comment	Author's comment (if agreed with reviewer, correct the manuscript and highlight that part in the manuscript. It is mandatory that authors should write his/her feedback here)
Compulsory REVISION comments	<p>The identity in Eq. (3) is not true. See demonstration</p> <p>Suppose the state equation</p> $S = S(U, V) \text{ (a)} ; dS = \left(\frac{\partial S}{\partial U}\right)_V dU + \left(\frac{\partial S}{\partial V}\right)_U dV \text{ (b)}$ <p>Now consider the state equation</p> $U = U(T, V) \text{ (c)} ; dU = \left(\frac{\partial U}{\partial T}\right)_V dT + \left(\frac{\partial U}{\partial V}\right)_T dV \text{ (d)}$ <p>Combining (b) and (d)</p> $dS = \left(\frac{\partial S}{\partial U}\right)_V \left(\frac{\partial U}{\partial T}\right)_V dT + \left[\left(\frac{\partial S}{\partial U}\right)_V \left(\frac{\partial U}{\partial V}\right)_T + \left(\frac{\partial S}{\partial V}\right)_U\right] dV \text{ (e)}$ <p>Also consider the state equation</p> $S = S(T, V) \text{ (f)} ; dS = \left(\frac{\partial S}{\partial T}\right)_V dT + \left(\frac{\partial S}{\partial V}\right)_T dV \text{ (g)}$ <p>Comparing the equations (e) and (g)</p> $\left(\frac{\partial S}{\partial V}\right)_T = \left(\frac{\partial S}{\partial V}\right)_U + \left(\frac{\partial S}{\partial U}\right)_V \left(\frac{\partial U}{\partial V}\right)_T \text{ (h)}$ <p>From the relation</p> $dS = \frac{1}{T} dU + \frac{p}{T} dV \text{ (i)}$ <p>Compared with equation (b)</p> $\left(\frac{\partial S}{\partial U}\right)_V = \frac{1}{T} \text{ (j)} \text{ and } \left(\frac{\partial S}{\partial V}\right)_U = \frac{p}{T} \text{ (k)}$ <p>Putting the equation (j) in (h)</p> $\left(\frac{\partial S}{\partial V}\right)_T = \left(\frac{\partial S}{\partial V}\right)_U + \frac{1}{T} \left(\frac{\partial U}{\partial V}\right)_T \text{ (l)}$ <p>Also from (i) and the Maxwell relation</p> $\left(\frac{\partial U}{\partial V}\right)_T = T \left(\frac{\partial S}{\partial V}\right)_T - p = T \left(\frac{\partial p}{\partial T}\right)_V - p$ <p>Therefore, $\left(\frac{\partial S}{\partial V}\right)_T \neq \left(\frac{\partial S}{\partial V}\right)_U$. So the identity $\frac{\alpha}{\beta} = \frac{P}{T}$ is derivate from a wrong assumption.</p> <p>At line 104: $\frac{C_p}{C_v} = \frac{\beta}{\beta_s} = \frac{B_s}{B}$</p>	<p>I did not write that always $\frac{\alpha}{\beta} = \frac{P}{T}$. I wrote that it is OFTEN the case. "Often when the internal energy U varies, then T varies and vice versa; hence in these cases: ..." This is sufficient for the conclusions of my paper.</p> <p>The equation:</p> $\left(\frac{\partial S}{\partial V}\right)_T = \left(\frac{\partial S}{\partial V}\right)_U + \frac{1}{T} \left(\frac{\partial U}{\partial V}\right)_T \text{ (l)}$ <p>When T is constant, then for many processes U is constant, and therefore, in the above equation the last term is zero.</p> <p>Let us introduce into a system a quantity of heat dQ isochorically: $dQ = dU = CdT$ where C is heat capacity. Then the last term on the right-hand side of the above eq. (l) turns to zero (because T is kept constant).</p> <p>In the general case: $dQ = dU + PdV$. In that case one can write $dU = C_1 dT$ where C_1 is a certain heat capacity.</p>
Minor REVISION comments	At line 33: From Eqs. (1), (2), and (3) and the combination of the first and second laws of thermodynamics	I have corrected.
Optional/General comments		