

Evaluating an Ice-Water Phase Transition Assertion

<https://gemini.google.com/app/ebcced8b66485cec>

Response: To evaluate this standard assertion-reason type question, we analyze both statements:

First Statement

- **Statement:** " $\text{H}_2\text{O}(s) \rightleftharpoons \text{H}_2\text{O}(l)$ is an endothermic process."
- **Evaluation: True.** The phase transition from solid ice to liquid water requires heat input ($\Delta H > 0$).

Second Statement

- **Statement:** "The process of melting of ice is favoured by high temperature and high pressure."
- **Evaluation: True.**
 - **Temperature Effect:** Since the forward process is endothermic ($\Delta H > 0$), increasing the temperature shifts the equilibrium to the right (favouring melting) according to Le Chatelier's principle.
 - **Pressure Effect:** Liquid water has a higher density than ice, meaning liquid water occupies a smaller molar volume than ice ($V_m(\text{liquid}) < V_m(\text{solid})$). Increasing pressure shifts the equilibrium toward the side with the smaller volume (the liquid phase), thus favouring melting.

Relationship Between Statements

- While both statements are factually correct on their own, the second statement is **not a correct explanation** for the first statement. The first statement simply asserts that the melting process absorbs heat (is endothermic), whereas the second statement describes how equilibrium shifts in response to temperature and pressure adjustments via Le Chatelier's principle.

Conclusion

- **First Statement:** True
- **Second Statement:** True

- **Explanation:** Second statement is **not** a correct explanation for the first statement.
 - **Standard A/L Option: (2)** (Both statements are true, but the second statement does not correctly explain the first statement).
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