

Evaluation of Chemical Periodic Properties

<https://gemini.google.com/app/15f1e004138ab535>

Response: **Analysis of Statement 1:**

- **Statement 1:** *"Unlike s-block elements, p-block elements do **not** give a characteristic colour to the oxidizing flame in the flame test."*
- **Evaluation: False.** Certain *p*-block elements (or their compounds) do impart characteristic colours to a non-luminous/oxidizing flame in flame testing. For example, Indium (In) and Thallium (Tl) give blue/violet and bright green flames, respectively. Furthermore, boron compounds impart a distinct apple-green colour, and lead (Pb) gives a faint blue/white flame.

Analysis of Statement 2:

- **Statement 2:** *"The first ionization energies of all p-block elements of periods 2 and 3 in the Periodic Table are greater than those of s-block elements of the corresponding period."*
- **Evaluation: True.**
 - **Period 2:** The *s*-block elements are Li and Be. The *p*-block elements are B, C, N, O, F, Ne. The lowest first ionization energy among the Period 2 *p*-block elements belongs to Boron (B, 801 kJ mol^{-1}). Since Be is 899 kJ mol^{-1} and Li is 520 kJ mol^{-1} , B (801 kJ mol^{-1}) is greater than Li (520 kJ mol^{-1}). However, let's look closely at Be vs B:
 - $\text{IE}_1(\text{Be}) = 899 \text{ kJ mol}^{-1} (2s^2)$
 - $\text{IE}_1(\text{B}) = 801 \text{ kJ mol}^{-1} (2s^2 2p^1)$
 - Thus, $\text{IE}_1(\text{B}) < \text{IE}_1(\text{Be})$, which means **not all** *p*-block elements in Period 2 have a higher first ionization energy than **all** *s*-block elements in that period.
 - **Period 3:** Similarly, $\text{IE}_1(\text{Mg}) = 738 \text{ kJ mol}^{-1} (3s^2)$ while $\text{IE}_1(\text{Al}) = 578 \text{ kJ mol}^{-1} (3s^2 3p^1)$. Therefore, $\text{IE}_1(\text{Al}) < \text{IE}_1(\text{Mg})$.
- **Verdict on Statement 2: False.**

Summary:

- **Statement 1: False**
- **Statement 2: False**

In standard G.C.E. A/L multiple-choice format (Statements 1 and 2 evaluation type):

- Since **both Statement 1 and Statement 2 are false**, the option selected is **(4)** or **(5)** depending on the specific exam year's key scheme (typically **Option (4)**: Both Statement 1 and Statement 2 are false).
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Response: Based on the response options for the G.C.E. A/L statement-based questions:

- **First Statement: False** (p-block elements/compounds like B, In, Tl, Pb, etc., do produce characteristic flame colours).
- **Second Statement: False** ($IE_1(\text{Be}) > IE_1(\text{B})$ in Period 2, and $IE_1(\text{Mg}) > IE_1(\text{Al})$ in Period 3).

Matching **First Statement: False** and **Second Statement: False** to the key table:

The correct choice is **(5)**.
