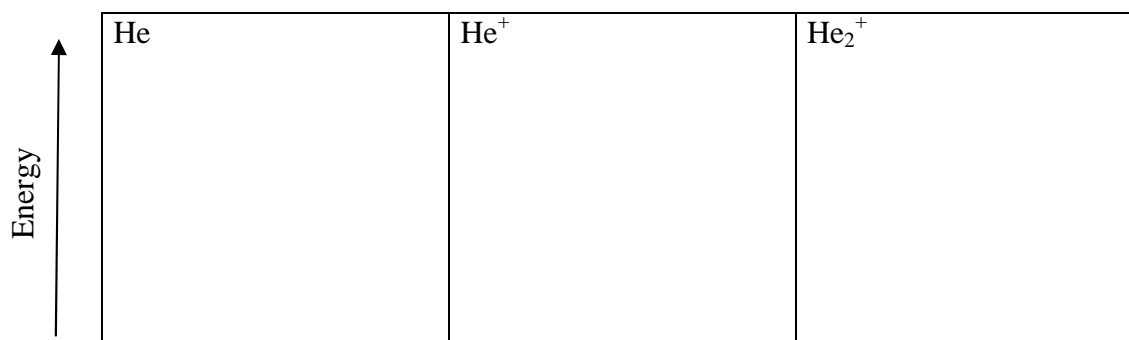


**Marks**  
**6**

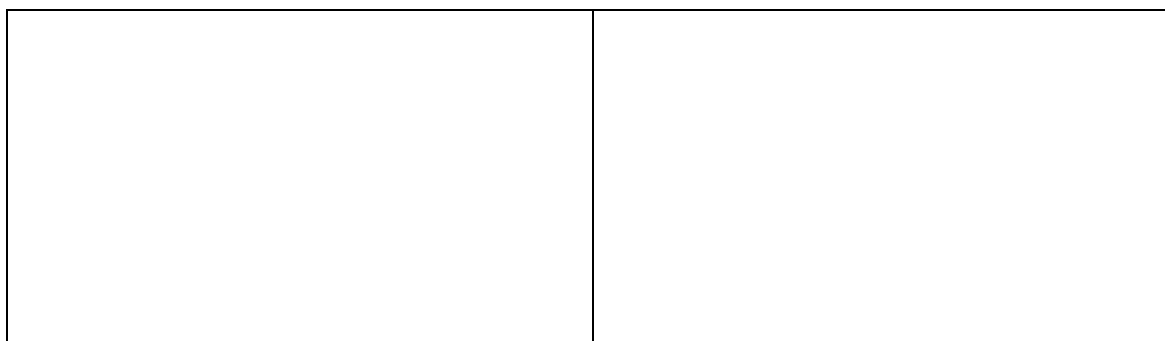
- In order to predict if it is possible to form the  $\text{He}_2^+$  cation, complete the following steps.

In the boxes below, draw an energy level diagram showing labelled electron orbitals and their occupancies for the two reacting species, He and  $\text{He}^+$ .

In the other box below, draw an energy level diagram showing labelled electron orbitals and their occupancies in a postulated  $\text{He}_2^+$  molecule. Use the same energy scale.



Draw the lobe representation of the two occupied molecular orbitals in this molecule. Show all nuclei and nodal surfaces.



What is the bond order of this molecular ion?

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Make a prediction about the stability of  $\text{He}_2^+$  in comparison to the  $\text{H}_2$  molecule.

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