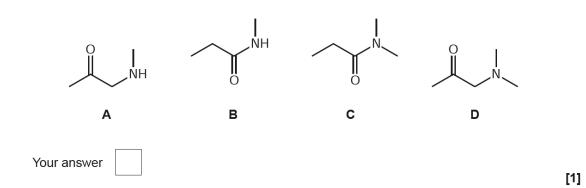
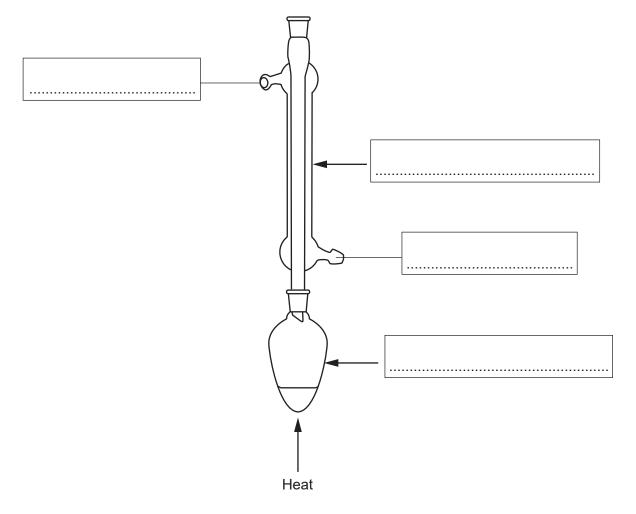
1. Which molecule is a secondary amine?



- 2. This question is about organic chemistry.
 - (a) This part is about two practical techniques used in organic preparations.
 - (i) Complete the missing labels on the diagram and name the technique.



Name of technique:[2]

(ii) Draw a labelled diagram to show apparatus set up for filtration under reduced pressure (vacuum filtration).

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- (b) This part is about amines.
 - (i) The table shows the structures and boiling points of three amines, which are structural isomers of $\rm C_3H_9N$.

Amine	CH ₃ CH ₂ CH ₂ NH ₂	(CH ₃) ₂ CHNH ₂	(CH ₃) ₃ N
Skeletal formula	NH ₂	NH ₂	
Boiling point/°C	48–49°C	33–34°C	3–4°C

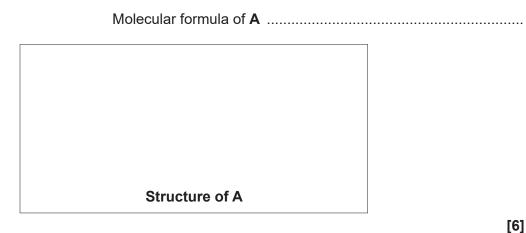
Explain the difference in the boiling points of the three amines.
[4]

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(ii) Amine A is a liquid at room temperature and pressure.

When vaporised, 0.202g of the amine produces $72.0\,\mathrm{cm^3}$ of gas at $1.00\times10^5\,\mathrm{Pa}$ and $100\,^\circ\mathrm{C}$. The $^{13}\mathrm{C}$ NMR spectrum of amine **A** has 3 peaks.

Determine the molecular formula of **A** and suggest a possible structure for amine **A**.



(c) The amino acid Z- H_2 NCH=CHCOOH can react to form a cyclic compound with the molecular formula C_3H_3 NO and one other product.

Complete the equation for this reaction.

[2]