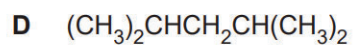
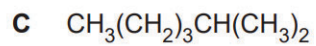
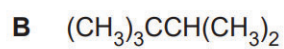
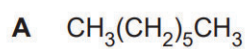


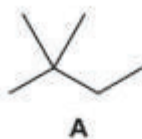
1. Which alkane has the **highest boiling point?** *least number of branched chains*



Your answer

[1]

2. The structure of hydrocarbon **A** is shown below.



- (a) Hydrocarbon **A** can be reacted with bromine in the presence of ultraviolet radiation to prepare $(\text{CH}_3)_3\text{CCHBrCH}_3$.

What is the systematic name for $(\text{CH}_3)_3\text{CCHBrCH}_3$?

2-bromo-3,3-dimethylbutane [1]

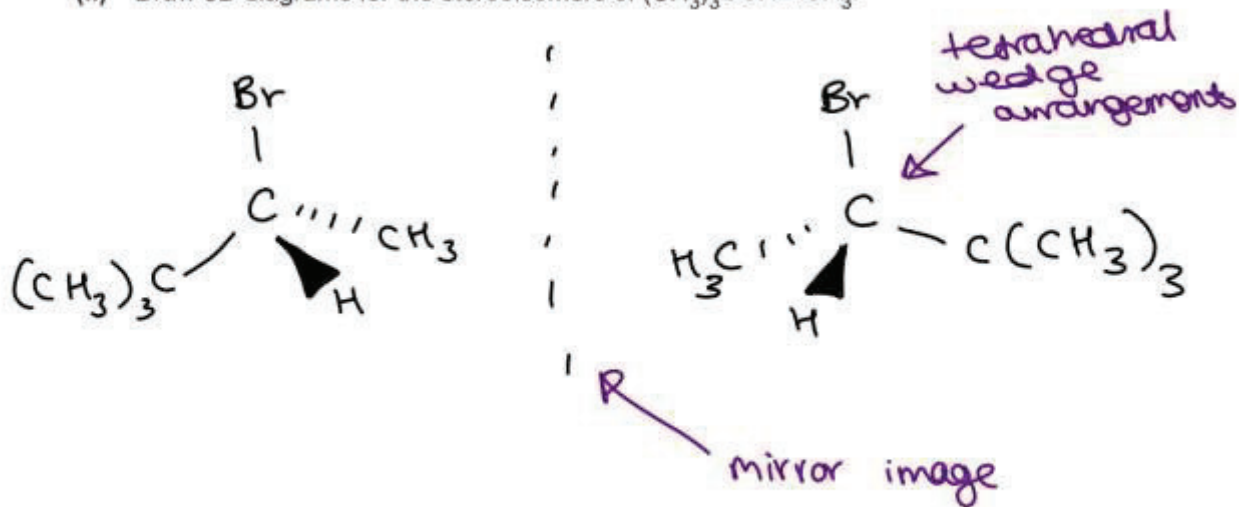
- (b) $(\text{CH}_3)_3\text{CCHBrCH}_3$ has stereoisomers.

- (i) Explain the term stereoisomers and name this type of stereoisomerism.

Explanation: Same structural formula but a different spatial arrangement of atoms

Type of stereoisomerism: optical [1]

- (ii) Draw 3D diagrams for the stereoisomers of $(\text{CH}_3)_3\text{CCHBrCH}_3$.



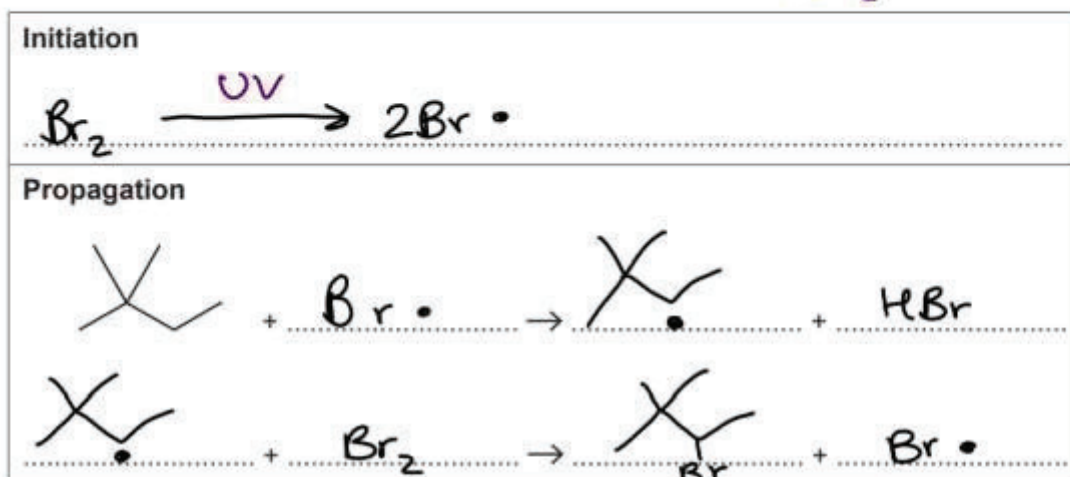
[2]

- (c) Complete the table to show the mechanism for the reaction of hydrocarbon A with Br_2 to form $(\text{CH}_3)_3\text{CCHBrCH}_3$.

Use skeletal formulae for all organic compounds.

Use 'dots' (•) to show the position of unpaired electrons.

free-radical substitution
common example with
 Cl_2



Termination: 2 radicals \rightarrow a non-radical

[3]

- (d) State two limitations of using radical substitution in organic synthesis.

1. further substitution(s) / produces different termination products / more than one termination step / mixture of products formed.
2. substitution at different positions along chain.

[2]