

Solutions

Original-task marking: M1 method, A1 accuracy, B1 reasoning.

2.1 2-methylpentane.

2.2 Ultraviolet light provides energy for homolytic cleavage of the Cl–Cl bond, producing chlorine radicals. Heating is not a second required condition for this stated UV route.

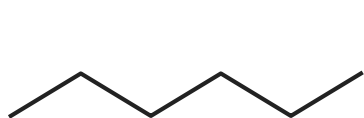
2.3 $\text{C}_{12}\text{H}_{26} + 18.5 \text{O}_2 \rightarrow 12 \text{CO}_2 + 13 \text{H}_2\text{O}$.

3.1 Subtract the atoms in two ethene molecules and one propene molecule: $\text{C} = 12 - 4 - 3 = 5$; $\text{H} = 26 - 8 - 6 = 12$. The alkane is C_5H_{12} , for example $\text{CH}_3\text{CH}(\text{CH}_3)\text{CH}_2\text{CH}_3$.

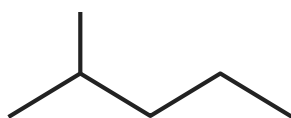
3.2 Initiation: $\text{Cl}_2 \rightarrow 2\text{Cl} \cdot$. Propagation: $\text{Cl} \cdot + \text{C}_2\text{H}_6 \rightarrow \text{HCl} + \text{C}_2\text{H}_5 \cdot$; $\text{C}_2\text{H}_5 \cdot + \text{Cl}_2 \rightarrow \text{C}_2\text{H}_5\text{Cl} + \text{Cl} \cdot$. Butane: a termination step $\text{C}_2\text{H}_5 \cdot + \text{C}_2\text{H}_5 \cdot \rightarrow \text{C}_4\text{H}_{10}$ – two ethyl radicals combining.

3.3 Five: n-hexane, 2-methylpentane, 3-methylpentane, 2,2-dimethylbutane, 2,3-dimethylbutane – any three skeletal formulas.

Every end and corner is a carbon; add H to make four bonds.



hexane



2-methylpentane



3-methylpentane