

27 Which intermediate ion forms in the greatest amount during the addition of HBr to propene?

- A $\text{CH}_3\text{CH}^+\text{CH}_3$
B $\text{CH}_3\text{CH}_2\text{CH}_2^+$
C $\text{CH}_3\text{CH}^-\text{CH}_2\text{Br}$
D $\text{CH}_3\text{CHBrCH}_2^-$

28 Two hydrocarbons, $\text{R}-\text{CH}_3$ and $\text{R}'-\text{CH}_3$, react separately with bromine in the presence of ultraviolet light. One of these hydrocarbons is unsaturated.

In each case, free radical substitution reactions occur.

R is $\text{CH}_3\text{CHC}(\text{CH}_3)$.

R' is $\text{CH}_3\text{CH}(\text{CH}_3)\text{CH}_2$.

Which row is correct?

	a propagation stage for the saturated hydrocarbon	a termination stage for the unsaturated hydrocarbon
A	$\text{R}-\text{CH}_2\cdot + \text{Br}\cdot \rightarrow \text{R}-\text{CH}_2\text{Br}$	$\text{R}'-\text{CH}_2\cdot + \text{Br}\cdot \rightarrow \text{R}'-\text{CH}_2\text{Br}$
B	$\text{R}-\text{CH}_2\cdot + \text{Br}_2 \rightarrow \text{R}-\text{CH}_2\text{Br} + \text{Br}\cdot$	$\text{R}'-\text{CH}_2\cdot + \text{Br}_2 \rightarrow \text{R}'-\text{CH}_2\text{Br} + \text{Br}\cdot$
C	$\text{R}'-\text{CH}_3 + \text{Br}\cdot \rightarrow \text{R}'-\text{CH}_2\cdot + \text{HBr}$	$2\text{R}-\text{CH}_2\cdot \rightarrow \text{R}-\text{CH}_2\text{CH}_2-\text{R}$
D	$2\text{R}'-\text{CH}_2\cdot \rightarrow \text{R}'-\text{CH}_2\text{CH}_2-\text{R}'$	$\text{R}-\text{CH}_3 + \text{Br}\cdot \rightarrow \text{R}-\text{CH}_2\cdot + \text{HBr}$

29 The fumes from the exhausts of petrol-burning cars contain the following pollutants.

- 1 unburnt hydrocarbons
2 nitrogen dioxide
3 carbon monoxide

Which pollutants are removed by oxidation in a catalytic converter?

- A 1, 2 and 3 B 1 and 2 only C 1 and 3 only D 2 and 3 only

27 What is the major product when 2-methylpent-2-ene reacts with hydrogen bromide?

- A 1-bromo-2-methylpentane
B 2-bromo-2-methylpentane
C 3-bromo-2-methylpentane
D 4-bromo-2-methylpentane

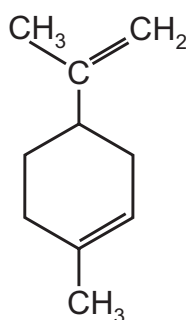
28 Pent-2-ene is reacted with cold, dilute, acidified manganate(VII) ions.

What is the major product?

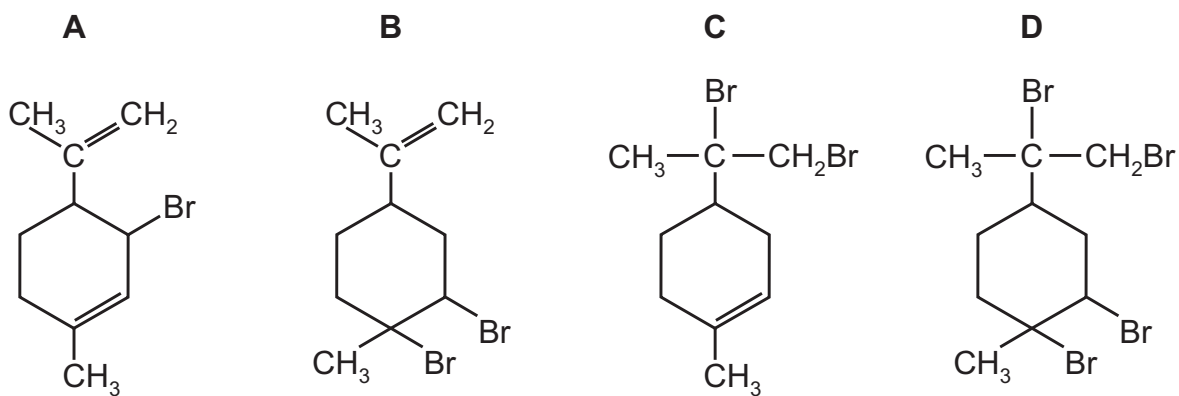
- A** $\text{CH}_3\text{CH}_2\text{CH}(\text{OH})\text{CH}(\text{OH})\text{CH}_3$
B $\text{CH}_3\text{CH}_2\text{COCOCH}_3$
C a mixture of $\text{CH}_3\text{CH}_2\text{CH}(\text{OH})\text{CH}_2\text{CH}_3$ and $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}(\text{OH})\text{CH}_3$
D $\text{CH}_3\text{CH}_2\text{COOH}$ and CH_3COOH

29 Limonene is an oil formed in the peel of citrus fruits.

limonene



Which product is formed when an excess of bromine, $\text{Br}_2(\text{l})$, reacts with limonene at room temperature in the dark?



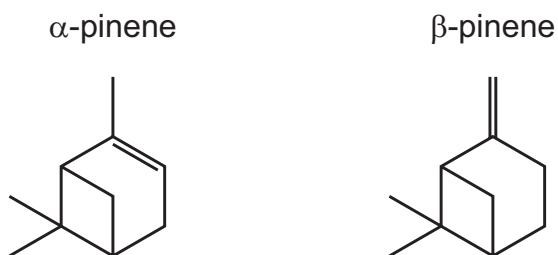
- 25** Two hydrocarbons, $\text{CH}_3\text{CHC}(\text{CH}_3)\text{CH}_3$ and $\text{CH}_3\text{CH}(\text{CH}_3)\text{CH}_2\text{CH}_3$, react separately with chlorine in the presence of ultraviolet light.

In each reaction, free-radical substitution occurs.

Which row is correct?

	identity of the hydrocarbon that can also undergo electrophilic addition	a termination stage of the free-radical substitution of the saturated hydrocarbon
A	$\text{CH}_3\text{CHC}(\text{CH}_3)\text{CH}_3$	$\text{CH}_3\text{CH}(\text{CH}_3)\text{CH}_2\text{CH}_2\cdot + \text{Cl}\cdot \rightarrow \text{CH}_3\text{CH}(\text{CH}_3)\text{CH}_2\text{CH}_2\text{Cl}$
B	$\text{CH}_3\text{CHC}(\text{CH}_3)\text{CH}_3$	$\text{CH}_3\text{CHC}(\text{CH}_3)\text{CH}_2\cdot + \text{Cl}\cdot \rightarrow \text{CH}_3\text{CHC}(\text{CH}_3)\text{CH}_2\text{Cl}$
C	$\text{CH}_3\text{CH}(\text{CH}_3)\text{CH}_2\text{CH}_3$	$\text{CH}_3\text{CH}(\text{CH}_3)\text{CH}_2\text{CH}_2\cdot + \text{Cl}\cdot \rightarrow \text{CH}_3\text{CH}(\text{CH}_3)\text{CH}_2\text{CH}_2\text{Cl}$
D	$\text{CH}_3\text{CH}(\text{CH}_3)\text{CH}_2\text{CH}_3$	$\text{CH}_3\text{CHC}(\text{CH}_3)\text{CH}_2\cdot + \text{Cl}\cdot \rightarrow \text{CH}_2\text{CHC}(\text{CH}_3)\text{CH}_2\text{Cl}$

- 29** Pinenes are unsaturated compounds. The structures of two pinenes are shown.



A mixture of these two pinenes reacts with hot concentrated acidified KMnO_4 .

What are the molecular formulae of the organic products?

- A** $\text{C}_9\text{H}_{14}\text{O}$ and $\text{C}_{10}\text{H}_{16}\text{O}_3$
- B** $\text{C}_9\text{H}_{14}\text{O}$ and $\text{C}_{10}\text{H}_{14}\text{O}_4$
- C** $\text{C}_9\text{H}_{16}\text{O}_2$ and $\text{C}_{10}\text{H}_{16}\text{O}_3$
- D** $\text{C}_9\text{H}_{16}\text{O}_2$ and $\text{C}_{10}\text{H}_{14}\text{O}_4$