A.

(a) 
\[
\begin{align*}
\text{reactant} & \quad \text{cis-2-methyl-1,4-pentadiene} \\
\text{catalyst/conditions} & \quad \text{H}_2\text{SO}_4
\end{align*}
\]

(b) 
\[
\begin{align*}
\text{reactant} & \quad \text{H}_2 \\
\text{catalyst/conditions} & \quad \text{Pd-C}
\end{align*}
\]

(c) 
\[
\begin{align*}
\text{Structure} & \quad \text{of an organic compound}
\end{align*}
\]

B.

(a) 
\[
\begin{align*}
\text{Structure} & \quad \text{of another compound}
\end{align*}
\]

\text{there are 3 other stereoisomers}

(b) 
3

(c) 
\[
\begin{align*}
\text{2,6-dimethyl-1,5-heptadiene}
\end{align*}
\]
A.

(a) provide arrows

(b) provide intermediate and arrows

(c) provide intermediate and arrows

B.

(a) most stable carbocation after rearrangements

(b) \( C_{14}H_{14}O \) (six \(^{13}\)C-NMR signals)

(c) \( C_{14}H_{12} \) (six \(^{13}\)C-NMR signals)
A. Provide the intermediate between I and J. 

B. (i) Draw the organic product
(ii) Both
(iii) Reaction progress
A. \( \text{compound } Q \quad (C_8H_{16}) \)

B. (a) reaction mechanism

(b) \( \text{compound } K \quad \text{intermediate } L \quad \text{intermediate, with stereochemistry, plus the mechanism for the isomerization} \)

\( C_{11}H_{16}BrN \)