1. a) Give the complete IUPAC name of each compound. b) Classify each of the dienes as conjugated, cumulated, or isolated. c) Which of these absorbs UV-visible light at a longer wavelength? (E)-2-methyl-2,4-octadiene, (E)-2-methyl-octa-2,4-diene.

2. Draw the structure(s) of the organic product(s) of each of the following reactions.

3. Propose a synthesis of each of the compounds shown from the indicated starting materials and any other needed reagents.
allylic halide from alkene

b) \( \text{CH}_3\text{CH}=\text{CHCH}_2\text{Br} \) from \( \text{CH}_3\text{CH}_2\text{CHCH}_3 \)

also forms \( \text{Br} \) via \( \text{CH}_3\text{CH}=\text{CHCH}_3 \)

\[ \text{NBS} \]
\[ \text{ROOR} \]
\[ \text{H}_2\text{SO}_4, \Delta \]

4. Which of the following cations is the most stable? \( \text{C} \) Which is least stable? \( \text{b} \)

a) \( \text{a)} \)

b) \( \text{b)} \)

c) \( \text{c)} \)

5. Propose a mechanism for the following reaction.

\[ \text{cyclohexene} + \text{H}_2\text{O} \xrightarrow{\text{H}^+} \text{product} \]

6. Draw two resonance structures of the cation shown.

\[ \text{CH}_3\text{CH}_2\text{CH}_2\text{CH}==\text{CH}-\text{CH}_3 \]