1. Draw the major product(s) for the following reaction. Be sure to include stereochemistry if appropriate.

\[
\text{CH}_3\text{CH}_2\text{O} + \text{CN} \rightarrow ?
\]

2. What diene and dienophile should be used to make the following molecule?
3. (a) Calculate the percentage of each monochlorinated product expected from the reaction of \((\text{CH}_3)_2\text{CHCH}_2\text{CH}_3\) with \(\text{Cl}_2\) under photochemical conditions. The relative rates of alkyl radical formation by a chlorine radical are: 3\(^\circ\) C–H (5.0), 2\(^\circ\) C–H (3.8), and 1\(^\circ\) C–H (1.0).

(b) Now do the same for monobromination. The relative rates of R• formation by a Br• are: 3\(^\circ\) C–H (1600), 2\(^\circ\) C–H (82), and 1\(^\circ\) C–H (1.0).
4. How many alkyl halides can be obtained from the monochlorination of the following alkane (count constitutional isomers only)? For practice, draw each compound as a bond-line structure and give each a correct IUPAC name.

\[\text{structure image}\]

5. How many alkyl halides can be obtained from the monochlorination of the following alkane (but in this problem count both constitutional \textit{and} configurational isomers!)?

\[\text{structure image}\]