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

\[ \text{CH}_3\text{CH}_2\text{O} + \text{NO}_2 \rightarrow \]

2. (4) What diene and dienophile should be used to make the following molecule?
3. (6) 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: \(3^\circ (5.0), 2^\circ (3.8),\) and \(1^\circ (1.0)\).

4. (6) Draw the major product(s) for the following reaction. Indicate any relevant stereochemistry in the product(s) where important.

\[
\text{NBS} \quad \text{hv} \quad \text{CH}_2\text{Cl}_2
\]

5. (2) NBS is preferred over \(\text{Br}_2\) for doing allylic brominations because:

A. NBS generates a more powerful bromine atom than \(\text{Br}_2\).
B. The stereospecificity with NBS is better.
C. NBS minimizes electrophilic addition of \(\text{Br}_2\) to the double bond.
D. All of the above.