QUESTION 1

Give the best reaction sequence to accomplish the following transformation

QUESTION 2
MC27f

Which best describes the organic product or products of the following reaction sequence?

1. NBS/h\textsubscript{v}
2. K\textsuperscript{+} – O-t-Bu/DMF
3. BH\textsubscript{3} \cdot \text{THF}
4. H\textsubscript{2}O\textsubscript{2} / -OH
5. Conc. H\textsubscript{2}SO\textsubscript{4} / heat

\[ \text{Cyclic alkene} \xrightarrow{\text{NBS/hv}} \text{Br}\text{Cyclic alkene} \xrightarrow{\text{K}\textsuperscript{+} – O-t-Bu/DMF} \text{Cyclic alkene} \xrightarrow{\text{BH}\textsubscript{3} \cdot \text{THF}} \text{Cyclic alkene} \xrightarrow{\text{Conc. H\textsubscript{2}SO\textsubscript{4} / heat}} \text{Cyclic alkene} \xrightarrow{\text{H\textsubscript{2}O\textsubscript{2} / -OH}} \text{Product} \]

- These are equivalent, take either one
- Protonation/deprotonation unavoidable to give the same intermediate cation that would have been formed in an E1 mechanism (after rearrangement)
QUESTION 3
MC27k
Which correctly describes the reagents/conditions/reaction sequence to synthesize the provided alcohol from methylcyclohexane (ignore stereochemistry)?

A 1. NBS/h\text{v}, 2. Na\textsuperscript{+} –OH, 3. Hg(OAc\textsubscript{2})/H\textsubscript{2}O, 4. NaBH\textsubscript{4}

B 1. Br\textsubscript{2}/hv, 2. K\textsuperscript{+} –O-t-Bu, 3. BH\textsubscript{3}.THF, 4. –OH/H\textsubscript{2}O\textsubscript{2}

C 1. Br\textsubscript{2}/hv, 2. K\textsuperscript{+} –O-t-Bu, 3. Hg(OAc\textsubscript{2})/H\textsubscript{2}O, 4. NaBH\textsubscript{4}

D 1. NBS/h\text{v}, 2. Na\textsuperscript{+} –OH, 3. BH\textsubscript{3}.THF, 4. –OH/H\textsubscript{2}O\textsubscript{2}
QUESTION 4

MC27o

Which describes the best synthesis of those shown below (stereochemistry is ignored in this problem)?

A  
1. HBr
2. Na⁺ -OCH₃ / DMF
3. BH₃·THF
4. H₂O₂ /-OH

B  
1. HBr
2. K⁺ -O-t-Bu / DMF
3. Hg(OAc)₂ / H₂O
4. NaBH₄ / EtOH

C  
1. HBr
2. Na⁺ -OCH₃ / DMF
3. Hg(OAc)₂ / H₂O
4. NaBH₄ / EtOH

D  
1. HBr
2. K⁺ -O-t-Bu / DMF
3. BH₃·THF
4. H₂O₂ /-OH
QUESTION 5
MC27v

Which are the best reagents/conditions to perform the following reaction?

[Diagram of a reaction with a 3° Br bond being replaced by a double bond]

A  K⁺ - O-t-Bu
B  K⁺ - OMe
C  Na⁺ - OH
D  MeOH/heat

3° Br

K⁺ - O-t-Bu
DMF or acetone or acetonitrile etc.

least substituted
Anti-Sayetzeff

most substituted
Sayetzeff

This reaction converts a 3° halide into the less substituted of two possible elimination alkene products.

In order to ensure that the least substituted product is formed we need to use a bulky base, such as t-BuO⁻.

Use of a non-bulky base, such as MeO⁻, would lead to formation of the most substituted (and more stable) Sayetzeff product.

E₂ eliminations are fastest in polar aprotic solvents such as DMF, acetone or acetonitrile. However, use of an aprotic solvent is not REQUIRED, and in fact we will see that many of the standard bases such as t-BuO⁻ are most readily prepared in polar protic solvents. For this reason we will soon start to put less emphasis the solvent in E₂ and SN₂ reactions.
QUESTION 6
MC27x

Which are the best reagents/conditions to perform the following conversion?

A 1. NBS/hν 2. Na⁺ −OH
B 1. NBS/hν 2. Na⁺ −O−tBu
C 1. Br₂/hν 2. Na⁺ −OH
D 1. Br₂/hν 2. Na⁺ −O−tBu

We need to add Br in the allylic position and AVOID addition of Br₂ to the C=C bond, which means that we must use NBS/hν instead of Br₂/hν. NBS/hν is useful for ALL radical brominations, including simple alkanes.

We next need to make sure that we get elimination and not substitution, so we need a bulky base, not Na⁺ −OH.
QUESTION 7

Give the best reaction sequence to accomplish the following transformation

C 1. NBS/hv 2. Na\(^+\) –O-t-Bu 3. BH\(_3\).THF 4. –OH/H\(_2\)O\(_2\)
D 1. NBS/hv 2. Na\(^+\) –OH 3. BH\(_3\).THF 4. –OH/H\(_2\)O\(_2\)
QUESTION 8

Which of the following situations best describes the rules for submitting quizzes in this class?

A You spend a lot of time on the quiz but forget to submit it before the deadline, so you send Dr. Gould an email explaining this and he enters your quiz scores for you after the deadline.

B There are NO excuses for missing any quiz, that is what the dropped quizzes are for.

C You spend a lot of time on a quiz, but there is a computer problem just before the deadline and you can't submit it, you send an email to Dr. Gould explaining this.

D You spend no time at all on the quiz, but you send an email to Dr. Gould pretending that you forgot to submit the answers and hope for the best.