QUESTION 1

What are the best reagents/conditions to perform the following simple synthesis?

A
1. NBS/hν
2. K⁺ –O-t-Bu
3. Br₂
4. Excess NaNH₂
5. H₂O
6. HgSO₄/H₂SO₄/H₂O

B

C
1. NBS/hν
2. Na⁺ –OMe
3. Br₂
4. Excess NaNH₂
5. H₂O
6. HgSO₄/H₂SO₄/H₂O

D
1. Br₂/hν
2. Na⁺ –OMe
3. Br₂
4. Excess NaNH₂
5. H₂O
6. HgSO₄/H₂SO₄/H₂O

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NBS/hν → K⁺ –O-t-Bu → Br → Br₂
H₂O → H → HgSO₄/H₂SO₄/H₂O

Excess NaNH₂
QUESTION 2
MC28s

Give the product of the following reaction

1. \[ \text{Na}^\oplus \text{Ph} \equiv : \rightarrow \text{???} \]

2. \[ \text{H}_3\text{O}^+ \]

A \[ \text{Ph} \equiv \text{HO} \]

C \[ \text{Ph} \equiv \text{COH} \]

B \[ \text{Ph} \equiv \text{OH} \]

D \[ \text{Ph} \equiv \text{HOH} \]

the acetylide anion attacks LEAST substituted end for steric reasons, there is no ELECTRONIC reason to attack the most substituted end as there would be if the oxygen were protonated, although in that case it still wouldn't actually attack the most substituted end, the acetylide would simply remove the proton from the oxygen!
QUESTION 3

Give the product of the following reaction:

1. \( \text{Na}^+ \) + \( \text{A} \) → ???

2. ?? + \( \text{H}_3\text{O}^+ \) → ???

A: \( \text{B} \)

C: \( \text{C} \)

D: \( \text{D} \)

\( \text{Na}^+ \) + \( \text{B} \) → \( \text{C} \)

\( \text{H}_3\text{O}^+ \) → \( \text{D} \)

\( \text{D} \) = \( \text{H}_3\text{O}^+ \) + \( \text{Na}^+ \)
QUESTION 4

Which will be the product of the following reaction sequence?

1. Br₂/CCl₄
2. Excess NaNH₂
3. H₂O
4. HgSO₄/H₂SO₄/H₂O

3-methylpent-1-ene

A

B

C

D

Which of the following is the correct product:

A. OH
B. O
C. H
D. OH
QUESTION 5

Which represents the best synthesis of Y from X?

A 1. Br₂/hv
2. HC≡C⁻ +Na
3. NBS/hv
4. HC≡C⁻ +Na
5. H₂/Pd/C

B 1. Br₂/hv
2. Na⁺ −OMe
3. HBr/ROOR
4. HC≡C⁻ +Na
5. Na/NH₃(l)

C 1. Br₂/hv
2. t-BuO⁻ +K
3. HBr/ROOR
4. HC≡C⁻ +Na
5. H₂/Lindlar

D 1. Br₂/hv
2. t-BuO⁻ +K
3. NBS/hv
4. Na/NH₃(l)
5. Na/NH₃(l)

A 2° halide E₂+SN₂, this is not the best synthesis

B 2° halide E₂+SN₂
TWICE, this is not the best synthesis

C 2° halide E₂+SN₂, this is not the best synthesis

D 2° halide E₂+SN₂

after this it is a mess!

2° halide E₂+SN₂
QUESTION 6
MC28o

Which of the following reactions will make the bond indicated by the dashed line?

A. 1. O
   2. $\text{H}_3\text{O}^+$

B. 1. H
   2. $\text{H}_3\text{O}^+$

C. 1. O
   2. $\text{H}_3\text{O}^+$

D. 1. Br
   2. $\text{H}_3\text{O}^+$

B. Incorrect structure

C. Incorrect structure

D. Incorrect reaction!!
QUESTION 7
Which is the correct IUPAC name for the following structure?

A. (2R)-bromo-(3R)-methyloct-(5Z)-en-7-yne
B. (7S)-bromo-(6S)-methyloct-(3Z)-en-1-yne
C. (2S)-bromo-(3S)-methyloct-(5E)-en-7-yne
D. (7R)-bromo-(6R)-methyloct-(3Z)-en-1-yne

The longest chain that contains the functional groups, number to give the alkene lowest number. Z-alkene (or in this case, cis- would also be unambiguous).
QUESTION 8

MC26k

Which is the product of reaction of (3R)-bromo-(3,4S)-dimethylhexane with sodium methoxide in a polar aprotic solvent?

A  (E)-3,(4S)-dimethyl-2-hexene
B  (Z)-3,(4S)-dimethyl-2-hexene
C  (E)-3,4-dimethyl-3-hexene
D  (Z)-3,4-dimethyl-3-hexene

(3R)-bromo-(3,4S)-dimethylhexane =

\[
\begin{array}{c}
\text{C} \\
\text{Me} \\
\text{Et} \\
\text{Et} \\
\text{H} \\
\text{O} \\
\end{array}
\]

\[
\begin{array}{c}
\text{S} \\
\text{C} \\
\text{Me} \quad \text{Et} \\
\text{Et} \\
\text{H} \\
\text{O} \\
\end{array}
\]

\[
\begin{array}{c}
\text{Br} \\
\text{C} \\
\text{Me} \quad \text{Et} \\
\text{Et} \\
\text{H} \\
\text{O} \\
\end{array}
\]

\[
\begin{array}{c}
\text{E2} \\
\text{C} \\
\text{Me} \quad \text{Me} \\
\text{Et} \quad \text{Et} \\
\end{array}
\]

= (Z)-3,4-dimethyl-3-hexene

A tertiary bromide will only undergo elimination, methoxide is a strong base so the reaction must be E2 elimination.

The base is not bulky or sterically hindered, so we expect to make the most stable, substituted alkene and the reactive conformation for an E2 is as shown above.

The reactive conformation has the C-H and the C-Br bonds anti- and coplanar.