QUESTION 1

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

A

\[
\begin{align*}
1. & \text{ NBS/}h_v \\
2. & \text{ } K^+ - O-t-\text{Bu} \\
3. & \text{ Br}_2 \\
4. & \text{ Excess NaNH}_2 \\
5. & \text{ H}_2\text{O} \\
6. & \text{ HgSO}_4/\text{H}_2\text{SO}_4/\text{H}_2\text{O}
\end{align*}
\]

B

\[
\begin{align*}
1. & \text{ Br}_2/\text{hv} \\
2. & \text{ Na}^+ - \text{OMe} \\
3. & \text{ Br}_2 \\
4. & \text{ Excess NaNH}_2 \\
5. & \text{ H}_2\text{O} \\
6. & \text{ HgSO}_4/\text{H}_2\text{SO}_4/\text{H}_2\text{O}
\end{align*}
\]
QUESTION 2

Give the product of the following reaction

\[
\begin{align*}
\text{Na}^\ominus & \quad \text{(1)} \quad \triangle \quad \text{???} \\
\text{Ph} \equiv :^\ominus & \quad \rightarrow \\
\text{???} & \\
\text{H}_3\text{O}^+ & \\
\text{A} & \quad \text{Ph} \equiv -
\end{align*}
\]

A \quad \text{Ph} \equiv -
\quad \text{HO}

B \quad \text{Ph} \equiv -
\quad \text{OH}

C \quad \text{Ph} \equiv -
\quad \text{OH}

D \quad \text{Ph} \equiv -
\quad \text{OH}

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

MC28y

Give the product of the following reaction

\[
\begin{align*}
\text{1. } & \text{Na}^+ \quad \text{1. } \quad \text{O} \\
& \quad \text{2. } \quad \text{H}_3\text{O}^+ + \quad \text{???} \\
\end{align*}
\]

A

\[
\begin{align*}
\text{HO} \\
\end{align*}
\]

B

\[
\begin{align*}
\text{OH} \\
\end{align*}
\]

C

\[
\begin{align*}
\text{OH} \\
\end{align*}
\]

D

\[
\begin{align*}
\text{Na}^+ \quad \text{O} \\
\quad \text{Na}^+ \\
\quad \text{H}_3\text{O}^+ \\
\end{align*}
\]
QUESTION 4

Which will be the product of the following reaction sequence?

3-methylpent-1-ene \[ \xrightarrow{1. \ Br_2/CCl_4} \]

A

B

C

D

Excess NaNH_2

H_2O

HgSO_4/H_2SO_4/H_2O

Na^+ \Theta
**QUESTION 5**

Which represents the best synthesis of \( Y \) from \( X \)?

<table>
<thead>
<tr>
<th></th>
<th>( A )</th>
<th>( B )</th>
<th>( C )</th>
<th>( D )</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>( \text{Br}_2/\text{hv} )</td>
<td>( \text{Br}_2/\text{hv} )</td>
<td>( \text{Br}_2/\text{hv} )</td>
<td>( \text{Br}_2/\text{hv} )</td>
</tr>
<tr>
<td>2.</td>
<td>( \text{HC}≡\text{C}^- + \text{Na} )</td>
<td>( \text{Na}^+ -\text{OMe} )</td>
<td>( \text{t}-\text{BuO}^- + \text{K} )</td>
<td>( \text{t}-\text{BuO}^- + \text{K} )</td>
</tr>
<tr>
<td>3.</td>
<td>( \text{NBS}/\text{hv} )</td>
<td>( \text{HBr}/\text{ROOR} )</td>
<td>( \text{HBr}/\text{ROOR} )</td>
<td>( \text{NBS}/\text{hv} )</td>
</tr>
<tr>
<td>4.</td>
<td>( \text{HC}≡\text{C}^- + \text{Na} )</td>
<td>( \text{HC}≡\text{C}^- + \text{Na} )</td>
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<td>( \text{HC}≡\text{C}^- + \text{Na} )</td>
</tr>
<tr>
<td>5.</td>
<td>( \text{H}_2/\text{Pd/C} )</td>
<td>( \text{Na}/\text{NH}_3(\text{l}) )</td>
<td>( \text{H}_2/\text{Lindlar} )</td>
<td>( \text{Na}/\text{NH}_3(\text{l}) )</td>
</tr>
</tbody>
</table>

\[ \text{X} \quad \xrightarrow{\text{hv}} \quad \text{Y} \]

- **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, this is not the best synthesis.

After this, it is a mess!
QUESTION 6

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

A

B

C

D

incorrect structure

incorrect structure

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

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

Which best describes the products of the following reaction sequence? Stereochemistry is ignored in this problem.

1. 1 Equiv. HCl
2. 1 Equiv. HI
3. $H_2/Pd/C$
4. 1 Equiv. $K^+ - O-t-Bu$
5. $HBr/ROOR$

---

1. $t$-butoxide gives the most substituted alkene here (Sayetzeff) with the secondary halide, it would have given the least substituted (Hoffmann) alkene if the halide had been tertiary.
2. Iodide is a better leaving group than chloride.
3. Both cis- and trans-alkenes must be formed.

Luckily stereoisomers have been ignored throughout this problem, we will have a horrible mixture of diastereomers and enantiomers by now.