1. (2) Circle the correct IUPAC name for the compound in the box:

- 4-ethyl-3-methyl-1-pentene
- 3-methyl-4-vinyl-1-pentene
- 3,4-dimethyl-5-hexyn-1-ene
- 3,4-dimethyl-5-hexen-1-yne
- 3,4-dimethyl-1-hexyn-5-ene
- 3,4-dimethyl-1-hexen-5-yne

2. (3) Circle the name of the major organic product obtained from the following sequence of reactions:

\[ \text{H}_3\text{C} \equiv \text{CH} \xrightarrow{\text{NaNH}_2, \text{NH}_3} \text{CH}_2\text{CH}_2\text{CH}_2\text{Br} \xrightarrow{2 \text{ mol Br}_2/\text{CH}_2\text{Cl}_2} ? \]

- 2,2,3,3-tetramethylhexane
- 2,3-dibromohexane
- 3,3-dibromohexane
- 1,1,2,2-tetramethylhexane
- (E)-2,3-dibromohexene
- (Z)-2,3-dibromohexene

3. (4) Draw the structure of the main product for the following reaction:

\[ \text{CH}_3\text{C} \equiv \text{CH} \xrightarrow{1. \text{BH}_3, \text{THF}} \xrightarrow{2. \text{H}_2\text{O}_2, \text{H}_2\text{O}, \text{NaOH}} \]

4. (6) Write reagents (one molecule in each box) that are required to perform the following synthesis:

\[ \text{CH}_3\text{I} \text{ or CH}_3\text{Br} \]

5. (3) Which one of the following molecules is chiral?

- [Chiral Molecule A]
- [Chiral Molecule B]
- [Chiral Molecule C]
- [Non-Chiral Molecule D]

6. (3) Which one of the following molecules is meso compound?

- (2R,3R)-3-bromo-2-butanol
- cis-1-bromo-2-chlorocyclohexane
- (2R,3R)-dibromobutane
- (2R,3S)-dibromobutane
- (2R,3S)-3-bromo-2-butanol
- trans-1-bromo-2-chlorocyclohexane

7. (4) Assign R or S configuration to each chirality center in the following compounds (use the provided circles for your answers; 1 pt each):

<table>
<thead>
<tr>
<th>R</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>[Chirality Center 1]</td>
<td>[Chirality Center 2]</td>
</tr>
</tbody>
</table>

Overall Score: 25