For the following questions circle the best answer(s) from the choices provided.

1. Which of the following structural pairs represents contributors to a resonance hybrid?
   - A
   - B
   - C
   - D

2. In which compound does carbon have the highest oxidation state?
   - A) CH₄
   - B) HCN
   - C) H₂CO
   - D) CH₂Cl₂

3. Which of the following compounds would you expect to be most soluble in water?
   - A) CH₃CH₂
   - B) C₆H₁₂ (cyclohexane)
   - C) CH₃CH₂OH
   - D) C₂H₅OC₂H₅

4. The following compounds have similar molecular weights. Which has the highest boiling point?
   - A) CH₃CH=O
   - B) C₂H₅OH
   - C) CH₂OCH₃
   - D) CH₃CH₂CH₃

5. Which Lewis formula is the best representation of N₂O?
   - A
   - B
   - C
   - D

6. A Lewis formula for diazomethane, CH₂N₂, is shown on the left below. Which of the formulas within the brackets would be considered a proper resonance contributor to this structure?
Answer the following short answer questions in the spaces provided:

7. For the bromo substituted cyclohexane compound given below, circle the groups that are trans to the bromo substituent.

8. For the methyl substituted cyclohexane compound given above, X out the groups that will sterically interact with the methyl group in a 1,3-diaxial fashion. See above

9. Rank the given compounds based on their relative Brønsted acidities.

Strong acid: HI > HNO
Weak acid: NH₃ > HF

More acidic: HF > NH₃

10. For each of the carbon atoms below:

   (1) Identify the hybridization of the atomic orbital.
   (2) Indicate the oxidation number.
   (3) Whether the indicated carbon is primary, secondary, or tertiary.

<table>
<thead>
<tr>
<th>Carbon atom</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>(1) Hybridization</td>
<td>s⁢p³</td>
<td>s⁢p²</td>
<td>s⁢p³</td>
</tr>
<tr>
<td>(2) Oxidation number</td>
<td>-1</td>
<td>2⁺</td>
<td>3⁻</td>
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