Please show your work for all calculations, and report answers to the proper number of significant digits to receive full credit. For calculations, circle your final answer.

1. Draw Lewis structures, including all lone pairs, for each of the following compounds. Be sure to show all resonance structures for each compound.
   a. BHF₂ (B is the central atom)
   
   b. AsF₅
   
   c. HCO₂⁻ (C is the central atom)

2. a. Draw a Lewis structure for each reactant and product and use bond energies to estimate ΔH° for the following reaction:
   \[ \text{OH (g)} + \text{CH}_4 (g) \rightarrow \text{CH}_3 (g) + \text{H}_2\text{O (g)} \]
   
   b. The OH radical is generated when the energy in sunlight breaks one O–H bond in water. Determine the amount of energy needed to break one O–H bond. (Hint: the number in Table 9.4 is for one mole of O–H bonds.)
   
   c. Determine what frequency of light is needed to break one O–H bond. (Hint: the number in part b is the energy needed to break one O–H bond.)

Continued on reverse.
3. For each of the following molecules determine (for the central atom) the number of bonding pairs, number of lone pairs, total number of electron domains, electron domain geometry and molecular geometry.

<table>
<thead>
<tr>
<th></th>
<th># of bonding pairs</th>
<th># of lone pairs</th>
<th># of electron domains</th>
<th>Electron domain geometry</th>
<th>Molecular geometry</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>N≡N≡O</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b.</td>
<td>O≡N≡O</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c.</td>
<td>F≡S≡F</td>
<td></td>
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</tbody>
</table>

4. Explain why a ΔH° that is determined by using bond energies gives an estimate for the reaction enthalpy instead of an exact value.

5. **BONUS**

a. Draw a Lewis dot structure for the compound XeOF₄. All atoms should have a formal charge of zero.

b. Determine the molecular shape of the molecule that you drew in part a.