1.) Write the hybridization of all the atoms for the structure below.

```
sp^2
sp^2
sp^2
sp^2
sp^3
sp^3
```

2.) pKa of water = 15.74; pKa of acetylene = 25

\[
\text{CH}≡\text{C}^- + \text{H}_2\text{O} \xrightarrow{?} \text{CH}≡\text{CH}^- + \text{OH}^-
\]

acetylene

a.) equilibrium will favor the right side
b.) reaction will proceed as written; acetylene is a weaker acid than water
c.) Identify the acid, base, conjugate acid and conjugate base of the reaction.

\[
\text{CH}≡\text{C}^- + \text{H}_2\text{O} \xrightarrow{?} \text{CH}≡\text{CH}^- + \text{OH}^-
\]

base → acid → conjugate acid → conjugate base

3.) Draw the structure of CH₂O.

```
H-C=O

H
```

4.) Draw 2 possible isomers for C₄H₈.

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5.) Name the following molecules.

```
trans-1-bromo-3-methylcycloheptane
3-ethylhexane
3-ethyl-4-methylloctane
```