1. Draw the both chair conformations for cis-1-isopropyl-2-methylcyclohexane. Circle the most stable conformation and explain why.

a. If the energy difference ($\Delta G$) between these two conformations at room temp is 2.8 kcal/mol, what is the ratio of these two conformers?

2. Draw five (5) constitutional isomers of $C_6H_{12}$.

a. Choose two (2) of the constitutional isomers you drew, and provide two (2) stereoisomers for these molecules.
3. Draw resonance structures for the following molecules or ions:
   a. \( \text{CO}_3^{2-} \)
   b. \( \text{N}_3^- \)
   c. \( \text{CH}_3\text{CH}_2\text{CO}_2^- \)
   d. \( \text{N},\text{N}-\text{dimethylacetamide} \ - \text{CH}_3\text{CON(CH}_3)_2 \)
   e. \( \text{NO}_3^- \)
   f. 
   
   \[
   \text{[Resonance structure image]}
   
   \]
   g. aniline
   h. trinitrotoluene (TNT)
4. In the molecules below, label $R$ or $S$ or $meso$

a. 

b. 

c. 

d. 

e. 

f. 

g. 
5. Identify as identical, enantiomers, or diastereomers:

a. [Drawing of a molecule with Br and Cl substituents]

b. [Drawing of a molecule with Br and Cl substituents]

c. [Drawing of a molecule with three Br substituents]

d. [Drawing of a molecule with a OH group and a Cl atom]

e. [Drawing of a molecule with two NH$_2$ groups]

f. [Drawing of a molecule with two NH$_2$ groups]

g. [Drawing of a molecule with two OH groups and one Br substituent]

h. [Drawing of a molecule with two OH groups and one Br substituent]

6. Provide IUPAC names for the following molecules:

a. [Drawing of a molecule with a five-membered ring]

b. [Drawing of a molecule with a OH group]

c. [Drawing of a molecule with a cyclopentane ring]