1. Rank each group of alkanes in order of increasing boiling point. Explain your choice of order.

   a. \( \text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_3, \text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_3, \text{CH}_3\text{CH}_2\text{CH}_3 \)

   b. \( \text{CH}_3\text{CH}_2\text{CH}_2\text{CH}(\text{CH}_3)_2, \text{CH}_3(\text{CH}_2)_4\text{CH}_3, (\text{CH}_3)_2\text{CHCH(\text{CH}_3)_2} \)

2. For each alkane: (a) classify each carbon atom as 1°, 2°, 3°, or 4°; (b) classify each hydrogen atom as 1°, 2°, or 3°.

3. Draw the structure corresponding to each IUPAC name.

   a. 3-ethyl-2-methylhexane
   b. sec-butylcyclopentane
   c. 4-isopropyl-2,4,5-trimethylheptane
   d. cyclobutylcycloheptane
   e. 3-ethyl-1,1-dimethylcyclohexane
   f. 4-butyl-1,1-diethylcyclooctane
   g. 6-isopropyl-2,3-dimethylnonane
   h. 2,2,6,6,7-pentamethyloctane
   i. cis-1-ethyl-3-methylcyclopentane
   j. trans-1-tert-butyl-4-ethylcyclohexane
4. Convert each structure to a Newman projection around the indicated bond.

a.  

b.  

c.  

5. Rank the following conformations in order of increasing energy.

A  

B  

C  

D  

6. Draw a second chair conformation for each cyclohexane. Then decide which conformation is present in higher concentration at equilibrium.

a.  

b.  

c.  