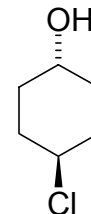
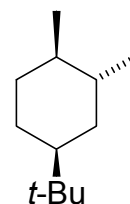
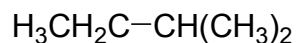
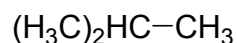


CHEM211 Problem Set
Reaction Energetics

- 1) For the molecules below:
- Draw the most stable and least stable conformations.
 - Calculate the difference in energy between the conformations.
 - Calculate the equilibrium constant (K_{eq}) for conversion between the conformations at room temperature (70 °F, 21 °C, 294 K).



- 2) Sketch an energy diagram to match each of the following descriptions:
- Fast reaction; $\Delta G^\circ = -120$ kJ/mol.
 - Slow reaction; $\Delta G^\circ = 20$ kJ/mol.
 - Very slow reaction; $K_{eq} = 1.36 \times 10^{-3}$.
 - Fast reaction; $K_{eq} = 3.0$.
 - A two step reaction; first step is fast; second step is slow; $\Delta G^\circ = -80$ kJ/mol.
 - $\Delta G_1^\ddagger = 200$ kJ/mol; $\Delta G_2^\ddagger = 50$ kJ/mol; $\Delta G^\circ = -40$ kJ/mol.
- 3) For each energy diagram in (2), label starting material(s) (**SM**), product(s) (**P**), intermediate(s) (**I**), transition state(s) (**TS[‡]**), activation energy(s) (**ΔG^\ddagger**) and free energy (**ΔG°**).
- 4) For the reactions below, calculate ΔG° , ΔH° and ΔS° .

