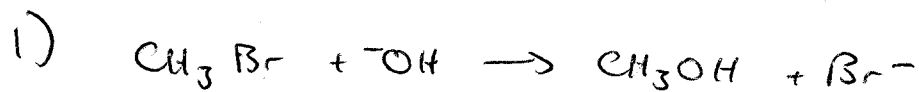
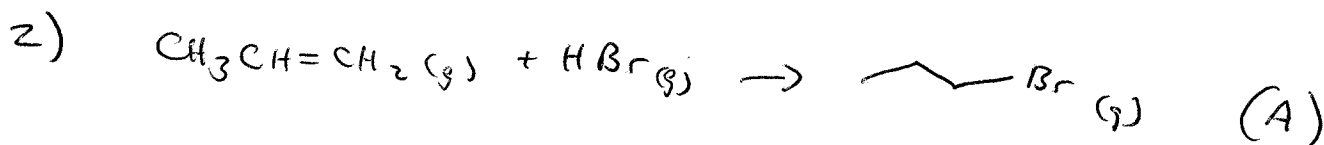


Problem set Ch. 4



$$\begin{aligned}\text{Rate} &= k_r [\text{CH}_3\text{Br}] [^-\text{OH}] \\ &= (5.3 \times 10^{-9} \text{ M}^{-1}\text{s}^{-1})(0.001)(0.01) \\ &= 5.3 \times 10^{-9} \text{ M s}^{-1}\end{aligned}$$



(a) $\Delta G_{\text{rxn}}(\text{A}) = \sum \Delta G_{\text{prod}} - \sum \Delta G_{\text{react}}$
 $= -5.37 - (14.99 - 12.73)$
 $= -7.63 \text{ kcal mol}^{-1}$

$\Delta G_{\text{rxn}}(\text{B}) = -6.51 - (14.99 - 12.73)$
 $= -8.77 \text{ kcal mol}^{-1}$

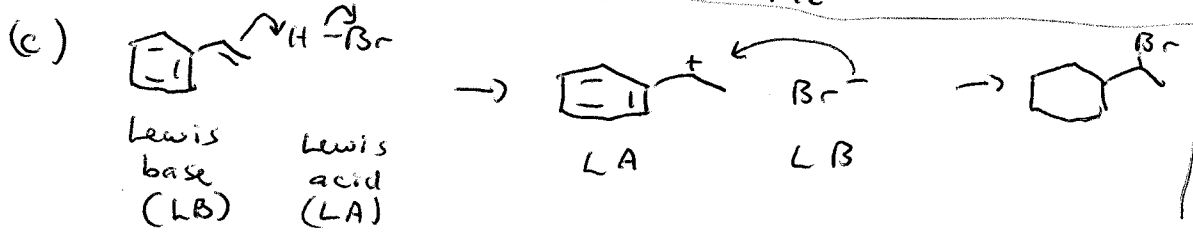
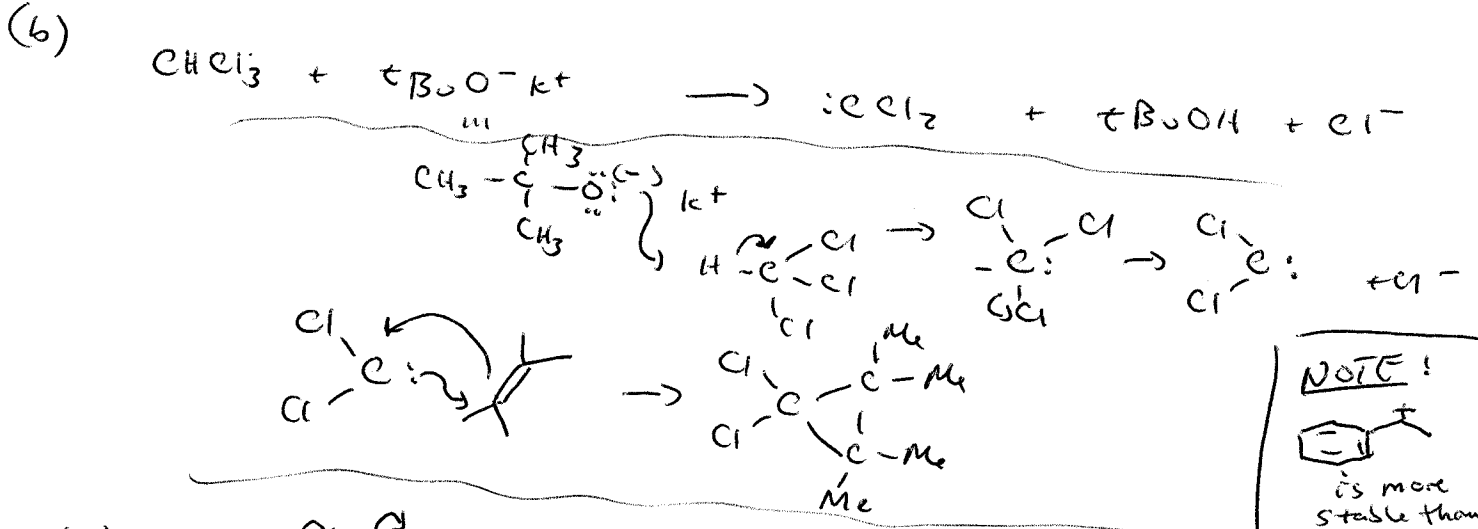
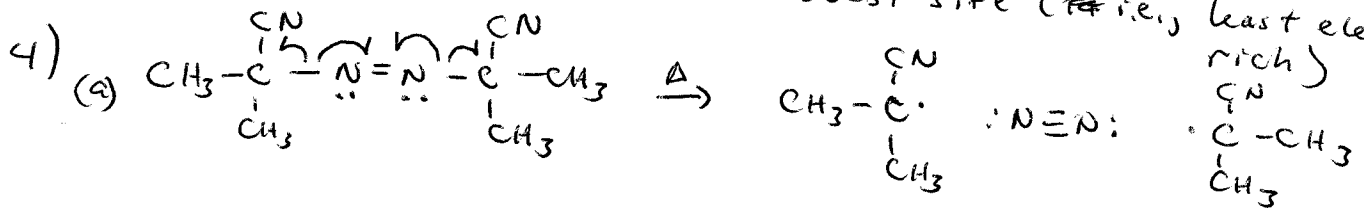
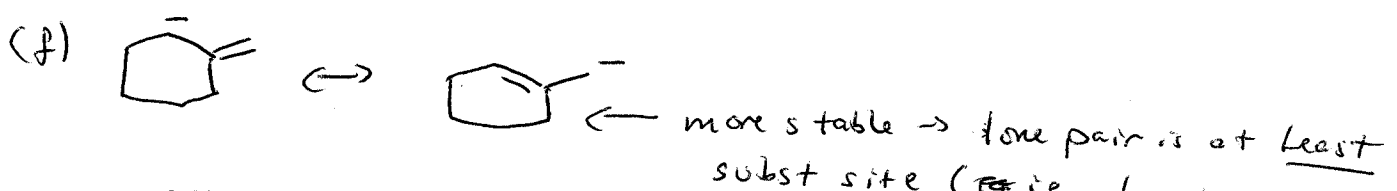
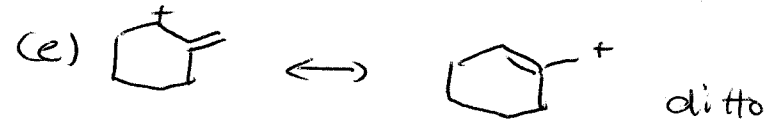
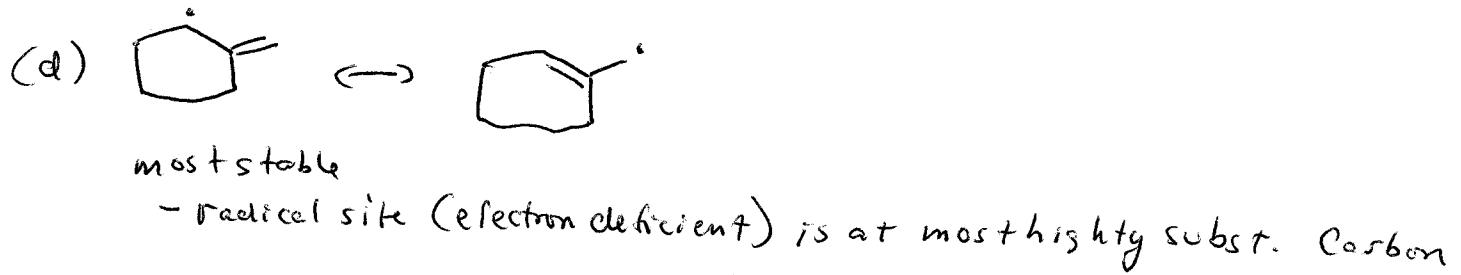
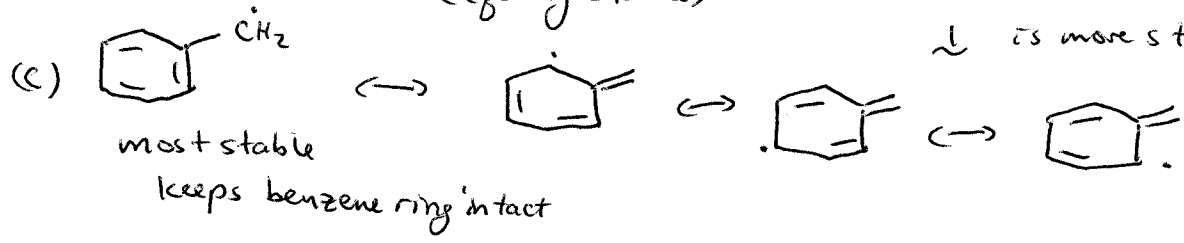
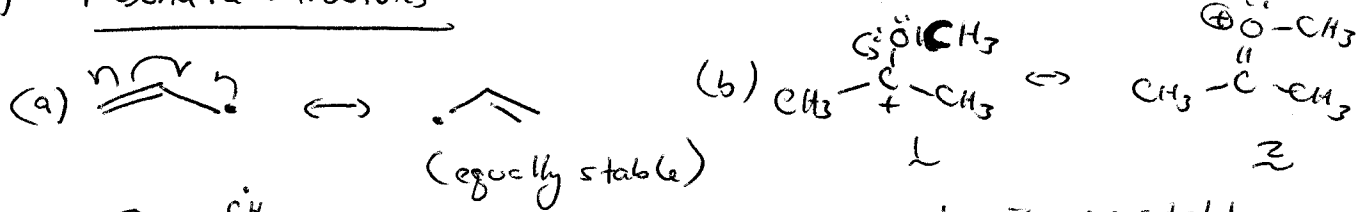
(b) rxn (B) is preferred \rightarrow more exothermic rxn

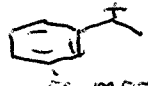

(c) $K_{\text{eq}} = \exp\left(\frac{-\Delta G}{RT}\right) \Rightarrow$ because $\Delta G = -RT \ln K_{\text{eq}}$

$\therefore K_{\text{eq}} = \exp\left(\frac{+8.77 \text{ kcal mol}^{-1}}{1.987 \times 10^{-3} \text{ kcal mol}^{-1} \text{ K}^{-1} \cdot 298 \text{ K}}\right)$
 $= 2.706 \times 10^6$

$K_{\text{eq}} \approx 2.71 \times 10^6$

3) Resonance Structures



NOTE!
 is more stable than
 is not formed in this rxn!