2. (a) Write the complete mechanism of the following reaction. Showing all electron-pushing arrows and intermediates.

(b) Draw the structure of the rate-determining transition state for this reaction.

(c) Draw the Energy Diagram for this reaction. Label reactants, products and transition state as well as $\Delta G^o$ and $\Delta G^{\ddagger}$.

3. Give the product(s) of the following reactions.

(a) $\text{H}_2$ Pd/C

(b) HBr

(c) Cl$_2$ H$_2$O