California State Polytechnic University, Pomona

Dr. L. S. Starkey, Organic Chemistry I, CHM 3140, S_N2 vs. S_N1 Homework

In the reaction of the tosylate shown and sodium cyanide, both $S_{\rm N}2$ and $S_{\rm N}1$ mechanisms are possible.

For each reaction: a) predict the major product(s) expected. (stereochemistry?)

- b) provide a complete mechanism. (watch details: lone prs, formal charges, arrows)
- c) provide an E vs. POR diagram. (give structures for the transition states)

Complete		
Lewis		
structure		
for NaCN		

Bond-line
structure
for TsO

(tosylate LG)

(see Klein 7.10)

$$\begin{array}{c|c}
\hline
& NaCN \\
\hline
\hline
OTs & CH_3CN/water \\
& (solvent)
\end{array}$$

BONUS Experimentally, how could you determine which mechanism has predominated? Explain.