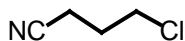


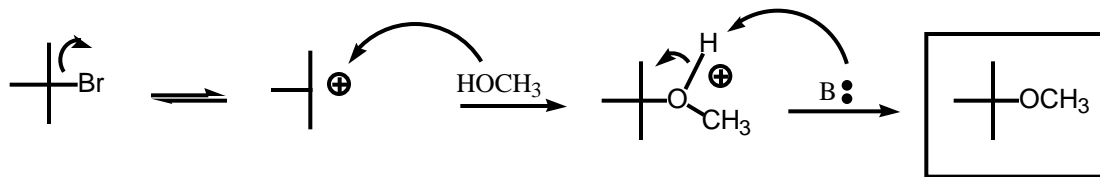
CHE 171  
Fall, 2003  
Quiz 8

Name \_\_\_\_\_  
Section 101 102 103 104 105 106  
(circle one)

1. A single organic product was obtained when 1-bromo-3-chloropropane was allowed to react with one molar equivalent of sodium cyanide in aqueous ethanol. What was the product? (10 pts)



2. Suggest a structure for the product of nucleophilic substitution obtained on solvolysis of *tert*-butyl bromide in methanol, and outline a reasonable mechanism for its formation. (10 pts)



3. Why does the carbocation intermediate in the hydrolysis of 2-bromo-3-methylbutane rearrange by way of a hydride shift rather than a methyl shift? (10 pts)

*The hydride shift results in formation of a lower energy 3° carbocation, while a methyl shift would be unproductive (converts one 2° carbocation to another).*

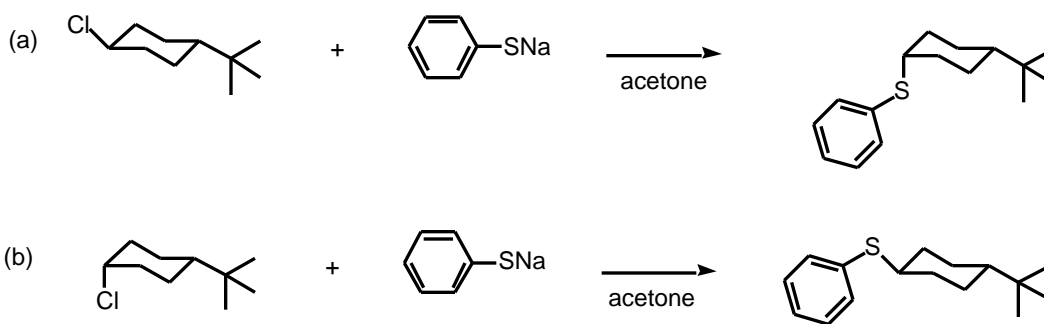
4. There is an overall 29-fold difference in reactivity of 1-chlorohexane, 2-chlorohexane, and 3-chlorohexane toward potassium iodide in acetone. (10 pts)  
(a) which one is the most reactive and why? ]

*The conditions of the reaction imply an  $S_N2$  mechanism, so the  $1^\circ$  substrate (1-chlorohexane) would react fastest.*

- (b) Two of the isomers differ by only a factor of 2 in reactivity. Which two are these? Which one is the more reactive and why?

*The two  $2^\circ$  substrates will be similarly reactive, but 3-chlorohexane will react slightly slower (half as fast) because it is slightly more sterically hindered.*

5. Each of the reactions shown involves nucleophilic substitution. The product of reaction (a) is an isomer of the product of reaction (b). What kind of isomer? By what mechanism does nucleophilic substitution occur? Write the structural formula of the product of each reaction. (10 pts)



*These products are stereoisomers, specifically diastereomers, and even more specifically cis-trans isomers. Both reactions occur via  $S_N2$  mechanism.*