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Chem. 121, Sect 010, Quiz 2   Fall, 2012, 50 points

1. (a) Show all possible mono-chlorination products that could be formed form 2,2-dimethylbutane. (b) Show the product and the complete reaction mechanism for the product formed from reaction at the secondary C-H. (c) Calculate the energy for this reaction using the bond dissociation energies given below. If the exact dissociation energy is not given, use the one from the table that is the closest match. (20 pts)

BDE'S	ΔH KJ/mol		ΔH KJ/mol
$(CH_3)_2CH-H$	413	$Cl-H$	432
CH_3CH_2-H	421	$(CH_3)_2CH-Cl$	355
$Cl-Cl$	243	CH_3CH_2-Cl	350

2. Give the product of the following reaction, showing all of the steps of the reaction mechanism. (10 pts)
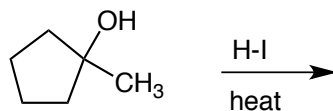
3. In the experiment for the preparation of 2-chloro-2-methylpropane (t-butyl chloride, M.W. 92.57, density = 0.85 g/mL)) from 2-methyl-2-propanol (t-butanol, M.W. = 74.12 g/mol, density = 0.775 g/mL), one student found that the bottle of concentrated hydrochloric acid was empty. He found a bottle of sodium chloride and 65% aqueous sulfuric acid in the hood in the lab. The stockroom was closed and so Teaching Assistant told him to go ahead and use these reagents. (a) Was the T.A. correct? Would the reaction still work? Explain your answer by showing the reaction that would occur. (b) If he used 12.0 mL of t-butanol, how much sodium chloride should he use in order to have 1.0 equivalent of sodium chloride? (c) Is the sulfuric acid to be used in a catalytic or stoichiometric amount? (d) If the student isolated 6.7 g of t-butyl chloride, what was his percent yield? (15 pts)

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4. In the fractional distillation experiment, one student had an unknown consisting of acetone (b.p. 56 °C) and water (b.p. 100 °C). If the student forgot to use the copper wire in his fractionating column, what would be the result of the distillation? Explain your answer. Be specific. (5 pts)