

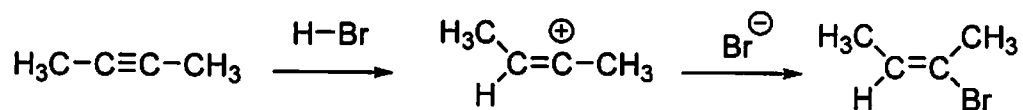
Name _____

If you do not want your graded exam placed in the box outside my office, then please mark a cross here _____

1-10 Are True/False (10pts)

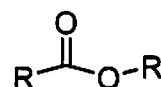
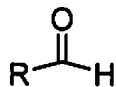
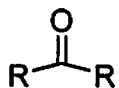
- 1) Terminal alkynes have the triple bond at the end of the carbon chain.
- 2) There are two different internal alkyne isomers of "pentyne".
- 3) The triple bonded Carbon atoms in an alkyne are sp hybridized.
- 4) Cyclobutanol is a cyclic, secondary alcohol.
- 5) The oxidation state (oxidation number) of Chromium in $\text{Na}_2\text{Cr}_2\text{O}_7$ is +6.
- 6) The Carbon-Carbon triple bond length is shorter than a Carbon-Carbon single bond.
- 7) Molecules with a Carbon-Metal covalent bond are called organowoodic reagents.
- 8) Tertiary alcohols can be oxidized to aldehydes and carboxylic acids.
- 9) A triple bond consists of two π bonds and one σ bond.
- 10) But-1-yne is more acidic than But-2-yne.

11) (3+1=4pts) a) Draw in the curly arrows to show the mechanism of the following electrophilic addition reaction.



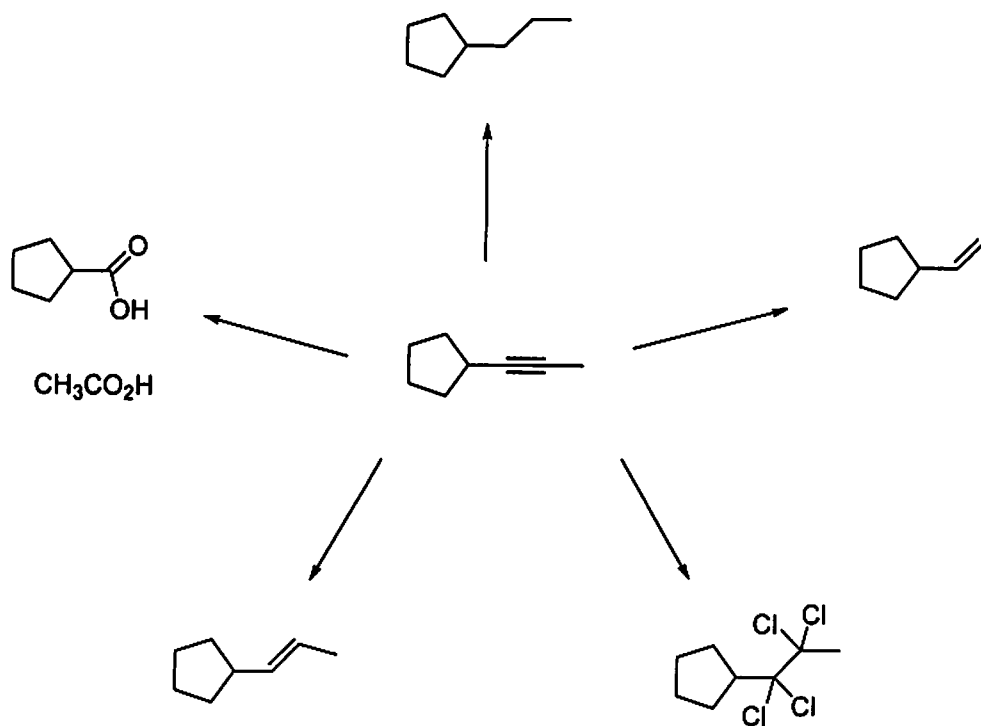
b) In terms of regiochemistry (e.g. Markovnikov), how would you describe this reaction?

12) (3pts) Provide the functional groups (e.g. alkene) for the following three structures.

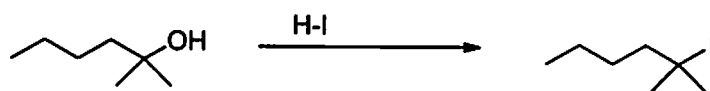


13) (2pts) Briefly explain the electronic difference between a hydride (H^-) and a proton (H^+).

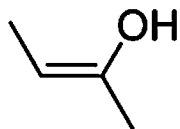
14) Provide reagents to achieve the following transformations. (10 pts)



15) Write the mechanism for the nucleophilic substitution of this tertiary alcohol. (4pts)



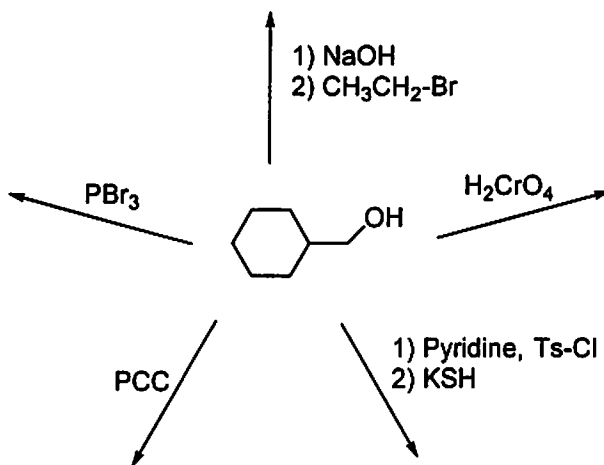
16) (2+2=4pts) Below is an example of an ENOL.



a) Why is an enol called an enol?

b) Draw the corresponding *keto* tautomeric form of the above *enol*.

17) Provide the products in the following reactions. (10pts)



18) Provide the reagents you could use to achieve this (multi step) transformation. (3pts)



*****BONUS QUESTION up to 3 points*****

Draw *trans*-3-(2-hydroxyethyl)cyclopentanol.

hydrogen 1 H 1.0079	beryllium 4 Be 9.0122	lithium 3 Li 6.941	sodium 11 Na 22.990	magnesium 12 Mg 24.305	potassium 19 K 39.098	calcium 20 Ca 40.078	scandium 21 Sc 44.956	titanium 22 Ti 47.867	vanadium 23 V 50.942	chromium 24 Cr 51.996	manganese 25 Mn 54.938	iron 26 Fe 55.845	cobalt 27 Co 58.933	nickel 28 Ni 58.693	copper 29 Cu 63.546	zinc 30 Zn 65.39	gallium 31 Ga 69.723	germanium 32 Ge 72.61	arsenic 33 As 74.922	selenium 34 Se 78.96	bromine 35 Br 79.904	krrypton 36 Kr 83.80	rubidium 37 Rb 85.468	strontium 38 Sr 87.62	yttrium 39 Y 88.906	zirconium 40 Zr 91.224	niobium 41 Nb 92.906	niobium 42 Mo 95.94	technetium 43 Tc 98	ruthenium 44 Ru 101.07	rhodium 45 Rh 102.91	palladium 46 Pd 106.42	silver 47 Ag 107.87	cadmium 48 Cd 112.41	indium 49 In 114.82	tin 50 Sn 118.71	antimony 51 Sb 121.76	tellurium 52 Te 127.60	iodine 53 I 126.90	xenon 54 Xe 131.29	barium 56 Ba 137.33	lanthanum 57 La 138.91	cerium 58 Ce 140.12	praseodymium 59 Pr 140.91	neodymium 60 Nd 144.24	promethium 61 Pm 144.9	samarium 62 Sm 150.36	europium 63 Eu 151.96	gadolinium 64 Gd 157.25	terbium 65 Tb 158.93	dysprosium 66 Dy 162.50	holmium 67 Ho 164.93	erbium 68 Er 167.26	thulium 69 Tm 168.93	ytterbium 70 Yb 173.04	francium 87 Fr 223	radium 88 Ra 226	actinium 89 Ac 227	thorium 90 Th 232.04	protactinium 91 Pa 231.04	uranium 92 U 238.03	neptunium 93 Np 237	plutonium 94 Pu 244	americium 95 Am 243	curium 96 Cm 247	berkelium 97 Bk 247	californium 98 Cf 251	einsteinium 99 Es 252	fermium 100 Fm 257	mendelevium 101 Md 258	nobelium 102 No 259	bohrium 107 Bh 108	hassium 108 Hs 108	meitnerium 109 Mt 109	unnilium 110 Uun 110	ununium 111 Uuu 111	ununium 112 Uub 112	ununium 113 Uuq 113	ununium 114 Uuq 114	ununium 115 Uuq 115	ununium 116 Uuq 116	ununium 117 Uuq 117	ununium 118 Uuq 118	ununium 119 Uuq 119	ununium 120 Uuq 120	ununium 121 Uuq 121	ununium 122 Uuq 122	ununium 123 Uuq 123	ununium 124 Uuq 124	ununium 125 Uuq 125	ununium 126 Uuq 126	ununium 127 Uuq 127	ununium 128 Uuq 128	ununium 129 Uuq 129	ununium 130 Uuq 130	ununium 131 Uuq 131	ununium 132 Uuq 132	ununium 133 Uuq 133	ununium 134 Uuq 134	ununium 135 Uuq 135	ununium 136 Uuq 136	ununium 137 Uuq 137	ununium 138 Uuq 138	ununium 139 Uuq 139	ununium 140 Uuq 140	ununium 141 Uuq 141	ununium 142 Uuq 142	ununium 143 Uuq 143	ununium 144 Uuq 144	ununium 145 Uuq 145	ununium 146 Uuq 146	ununium 147 Uuq 147	ununium 148 Uuq 148	ununium 149 Uuq 149	ununium 150 Uuq 150	ununium 151 Uuq 151	ununium 152 Uuq 152	ununium 153 Uuq 153	ununium 154 Uuq 154	ununium 155 Uuq 155	ununium 156 Uuq 156	ununium 157 Uuq 157	ununium 158 Uuq 158	ununium 159 Uuq 159	ununium 160 Uuq 160	ununium 161 Uuq 161	ununium 162 Uuq 162	ununium 163 Uuq 163	ununium 164 Uuq 164	ununium 165 Uuq 165	ununium 166 Uuq 166	ununium 167 Uuq 167	ununium 168 Uuq 168	ununium 169 Uuq 169	ununium 170 Uuq 170	ununium 171 Uuq 171	ununium 172 Uuq 172	ununium 173 Uuq 173	ununium 174 Uuq 174	ununium 175 Uuq 175	ununium 176 Uuq 176	ununium 177 Uuq 177	ununium 178 Uuq 178	ununium 179 Uuq 179	ununium 180 Uuq 180	ununium 181 Uuq 181	ununium 182 Uuq 182	ununium 183 Uuq 183	ununium 184 Uuq 184	ununium 185 Uuq 185	ununium 186 Uuq 186	ununium 187 Uuq 187	ununium 188 Uuq 188	ununium 189 Uuq 189	ununium 190 Uuq 190	ununium 191 Uuq 191	ununium 192 Uuq 192	ununium 193 Uuq 193	ununium 194 Uuq 194	ununium 195 Uuq 195	ununium 196 Uuq 196	ununium 197 Uuq 197	ununium 198 Uuq 198	ununium 199 Uuq 199	ununium 200 Uuq 200	ununium 201 Uuq 201	ununium 202 Uuq 202	ununium 203 Uuq 203	ununium 204 Uuq 204	ununium 205 Uuq 205	ununium 206 Uuq 206	ununium 207 Uuq 207	ununium 208 Uuq 208	ununium 209 Uuq 209	ununium 210 Uuq 210	ununium 211 Uuq 211	ununium 212 Uuq 212	ununium 213 Uuq 213	ununium 214 Uuq 214	ununium 215 Uuq 215	ununium 216 Uuq 216	ununium 217 Uuq 217	ununium 218 Uuq 218	ununium 219 Uuq 219	ununium 220 Uuq 220	ununium 221 Uuq 221	ununium 222 Uuq 222	ununium 223 Uuq 223	ununium 224 Uuq 224	ununium 225 Uuq 225	ununium 226 Uuq 226	ununium 227 Uuq 227	ununium 228 Uuq 228	ununium 229 Uuq 229	ununium 230 Uuq 230	ununium 231 Uuq 231	ununium 232 Uuq 232	ununium 233 Uuq 233	ununium 234 Uuq 234	ununium 235 Uuq 235	ununium 236 Uuq 236	ununium 237 Uuq 237	ununium 238 Uuq 238	ununium 239 Uuq 239	ununium 240 Uuq 240	ununium 241 Uuq 241	ununium 242 Uuq 242	ununium 243 Uuq 243	ununium 244 Uuq 244	ununium 245 Uuq 245	ununium 246 Uuq 246	ununium 247 Uuq 247	ununium 248 Uuq 248	ununium 249 Uuq 249	ununium 250 Uuq 250	ununium 251 Uuq 251	ununium 252 Uuq 252	ununium 253 Uuq 253	ununium 254 Uuq 254	ununium 255 Uuq 255	ununium 256 Uuq 256	ununium 257 Uuq 257	ununium 258 Uuq 258	ununium 259 Uuq 259	ununium 260 Uuq 260	ununium 261 Uuq 261	ununium 262 Uuq 262	ununium 263 Uuq 263	ununium 264 Uuq 264	ununium 265 Uuq 265	ununium 266 Uuq 266	ununium 267 Uuq 267	ununium 268 Uuq 268	ununium 269 Uuq 269	ununium 270 Uuq 270	ununium 271 Uuq 271	ununium 272 Uuq 272	ununium 273 Uuq 273	ununium 274 Uuq 274	ununium 275 Uuq 275	ununium 276 Uuq 276	ununium 277 Uuq 277	ununium 278 Uuq 278	ununium 279 Uuq 279	ununium 280 Uuq 280	ununium 281 Uuq 281	ununium 282 Uuq 282	ununium 283 Uuq 283	ununium 284 Uuq 284	ununium 285 Uuq 285	ununium 286 Uuq 286	ununium 287 Uuq 287	ununium 288 Uuq 288	ununium 289 Uuq 289	ununium 290 Uuq 290	ununium 291 Uuq 291	ununium 292 Uuq 292	ununium 293 Uuq 293	ununium 294 Uuq 294	ununium 295 Uuq 295	ununium 296 Uuq 296	ununium 297 Uuq 297	ununium 298 Uuq 298	ununium 299 Uuq 299	ununium 300 Uuq 300
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* Lanthanide series

** Actinide series

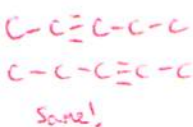
lanthanum 57 La	cerium 58 Ce	praseodymium 59 Pr	neodymium 60 Nd	promethium 61 Pm	samarium 62 Sm	europium 63 Eu	gadolinium 64 Gd	terbium 65 Tb	dysprosium 66 Dy	holmium 67 Ho	erbium 68 Er	thulium 69 Tm	ytterbium 70 Yb	actinium 89 Ac	thorium 90 Th	protactinium 91 Pa	uranium 92 U	neptunium 93 Np	plutonium 94 Pu	americium 95 Am	curium 96 Cm	berkelium 97 Bk	californium 98 Cf	einsteinium 99 Es	fermium 100 Fm	mendelevium 101 Md	nobelium 102 No
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Name DOUGLAS S. HALFUL

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1-10 Are True/False (10pts)

1) Terminal alkynes have the triple bond at the end of the carbon chain. T



2) There are two different internal alkyne isomers of "pentyne". false

3) The triple bonded Carbon atoms in an alkyne are sp hybridized. T



4) Cyclobutanol is a cyclic, secondary alcohol. T

5) The oxidation state (oxidation number) of Chromium in $Na_2Cr_2O_7$ is +6. T
 $+2$ -14

6) The Carbon-Carbon triple bond length is shorter than a Carbon-Carbon single bond. T

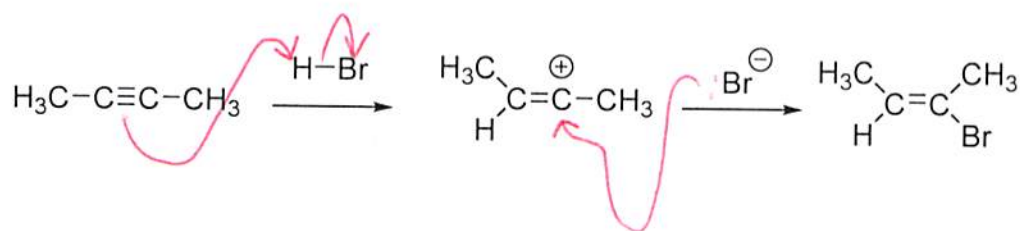
7) Molecules with a Carbon-Metal covalent bond are called organowoodic reagents. false

8) Tertiary alcohols can be oxidized to aldehydes and carboxylic acids. false

9) A triple bond consists of two π bonds and one σ bond. T

10) But-1-yne is more acidic than But-2-yne. T

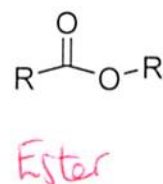
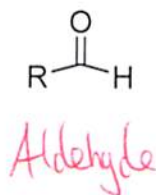
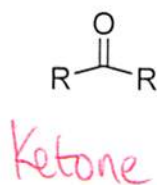
11) (3+1=4pts) a) Draw in the curly arrows to show the mechanism of the following electrophilic addition reaction.



b) In terms of regiochemistry (e.g. Markovnikov), how would you describe this reaction?

Neither M nor AM.

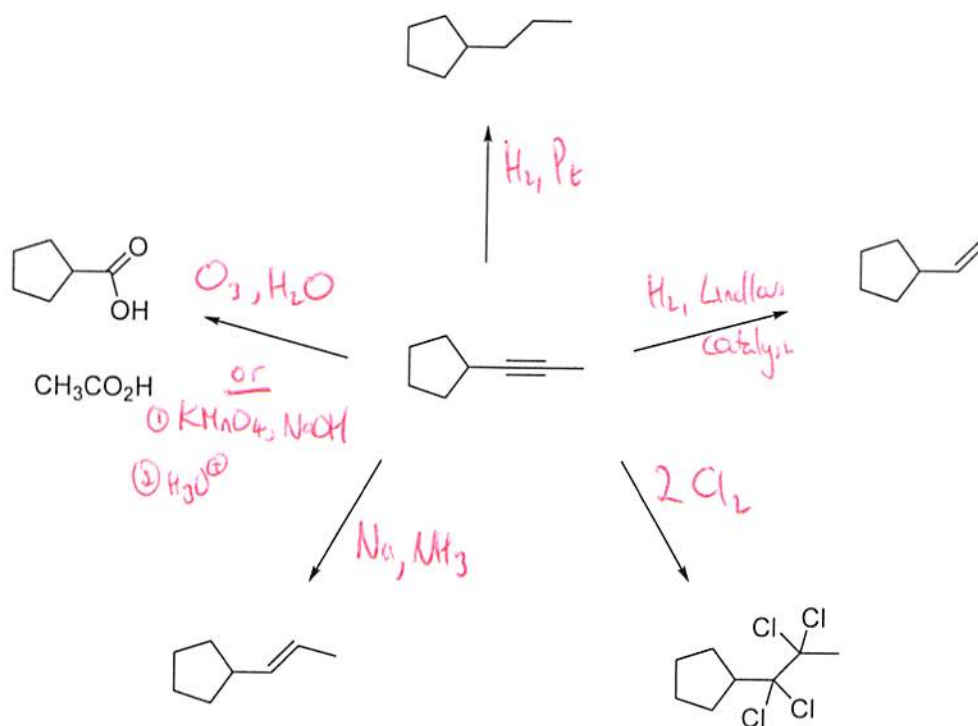
12) (3pts) Provide the functional groups (e.g. alkene) for the following three structures.



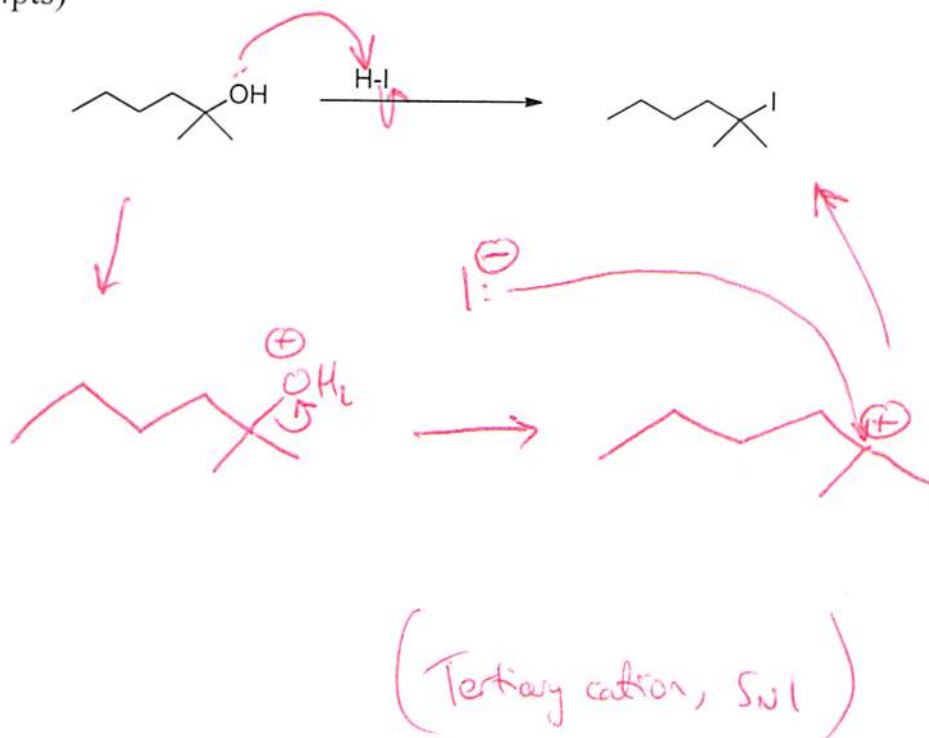
13) (2pts) Briefly explain the electronic difference between a hydride (H^-) and a proton (H^+).

Hydride is $:\text{H}^-$ (two electrons) whereas H^+ has zero electrons.

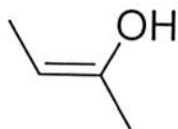
14) Provide reagents to achieve the following transformations. (10 pts)



15) Write the mechanism for the nucleophilic substitution of this tertiary alcohol. (4pts)



16) (2+2=4pts) Below is an example of an ENOL.



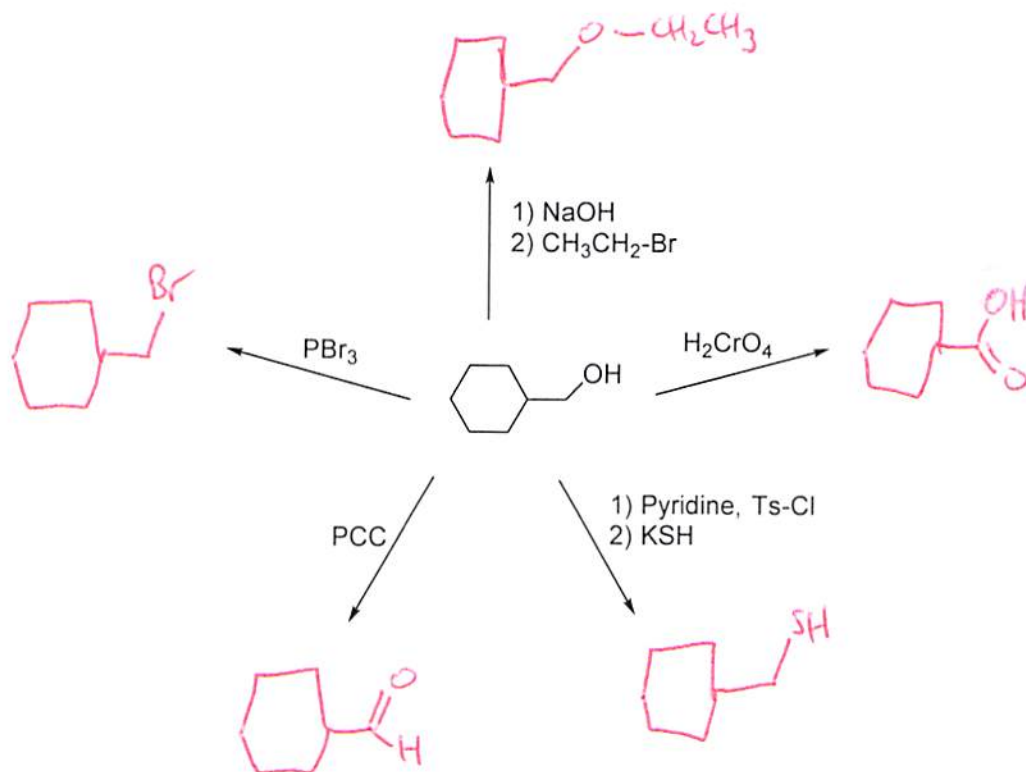
a) Why is an enol called an enol?

C=C is "ENE", C-OH = "OL", together make ENOL

b) Draw the corresponding *keto* tautomeric form of the above *enol*.



17) Provide the products in the following reactions. (10pts)



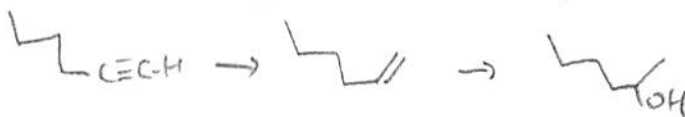
18) Provide the reagents you could use to achieve this (multi step) transformation. (3pts)



(A) $\text{H}_2\text{SO}_4, \text{H}_2\text{SO}_4, \text{H}_2\text{O}$ then $\text{NaBH}_4, \text{H}_2\text{O}$
 or $\text{LiAlH}_4, \text{H}_2\text{O}$
 or H_2, Pt



(B) $\text{H}_2, \text{Lindlar's Cat.}$ then H_3O^+ or any Markovnikov H/OH addn.
 or
 Na, NH_3



*****BONUS QUESTION up to 3 points*****

Draw *trans*-3-(2-hydroxyethyl)cyclopentanol.

