

Chemistry 1110 Fall 2002 Test 2

Thursday, October 24, 2002

Time: 1 hour 50 minutes

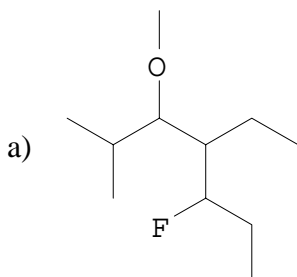
Name: \_\_\_\_\_

Student Number: \_\_\_\_\_

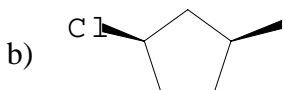
*This exam consists of **nine** pages of questions and a page containing names of the functional groups. Please ensure that you have a complete paper and, if you do not, obtain one from me **immediately**. Good luck!*

*Remember: **Neatness Counts!** If your structures are not clear I cannot mark them correct. Use any method you like to draw the structures required, but be sure that they're clear.*

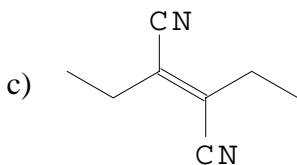
1) [26 marks] Name (IUPAC or common) the following compounds.



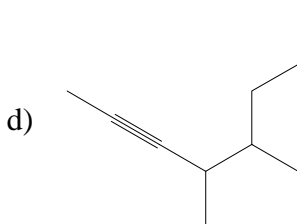
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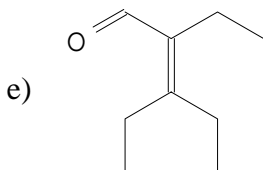
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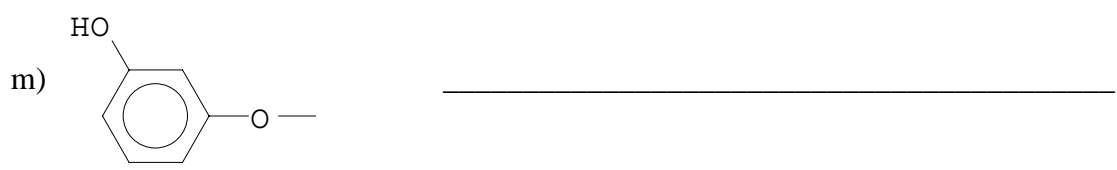
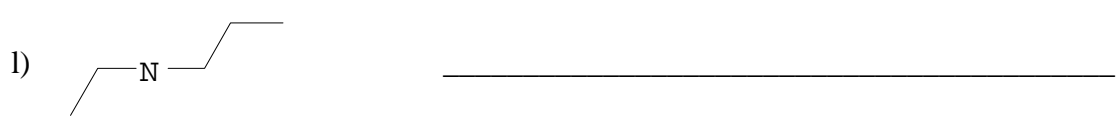
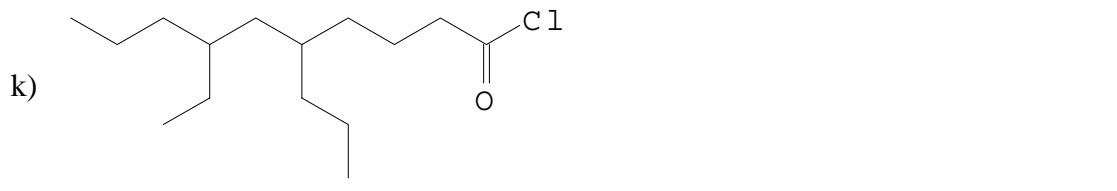
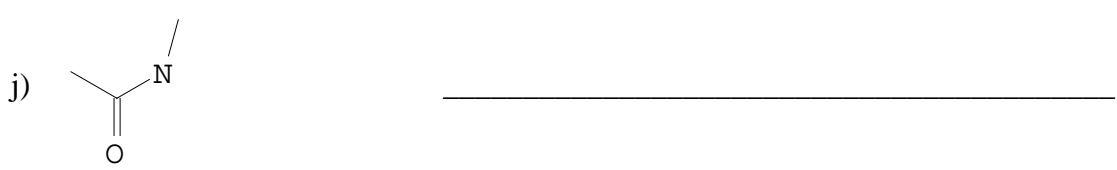
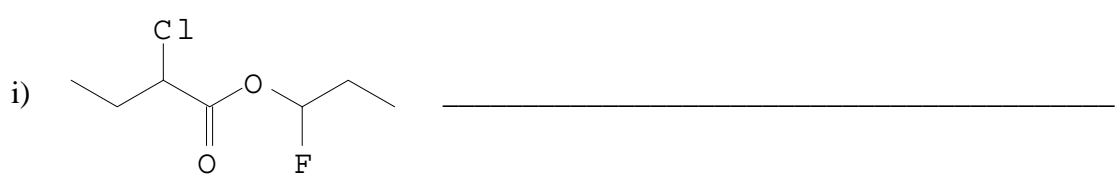
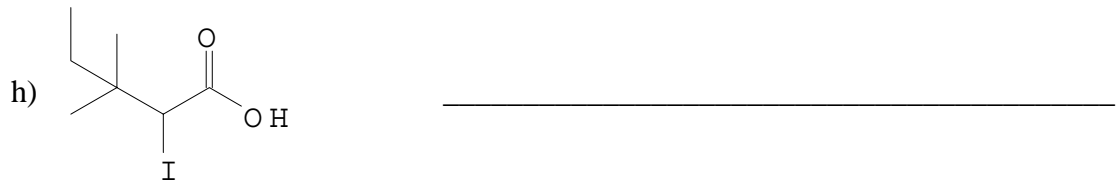
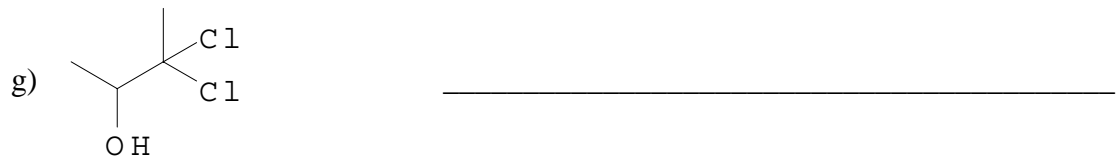
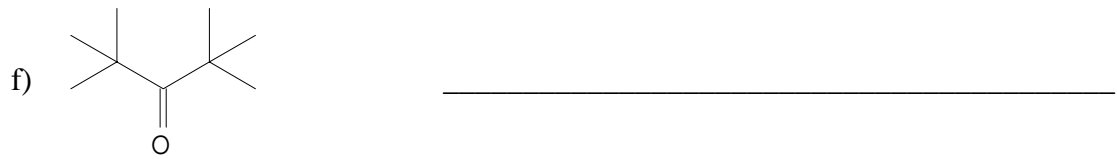
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2) [24 marks] Provide structures consistent with the following names.

a) 2-chloro-1-methoxypropane

b) trans-1,2-diethylcyclohexane

c) cis,trans-6,7-dichloro-2,4-heptadiene

d) 3-methoxy-1-butyne

e) 2,3-diethyl-2-pentenal

f) 4-cyano-6,6,7-triethoxy-2-octanone

g) methanoic acid

h) 2-fluoropropyl 3-methylhexanoate

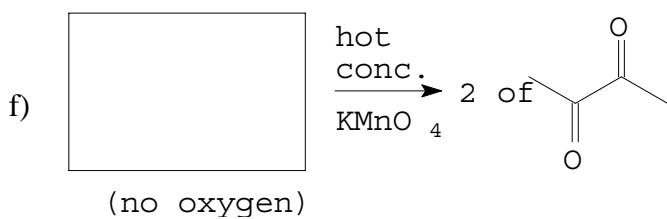
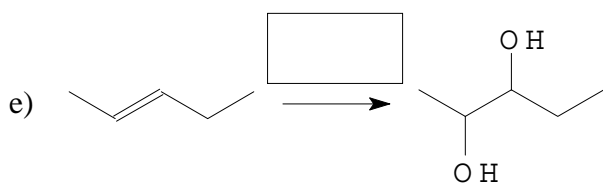
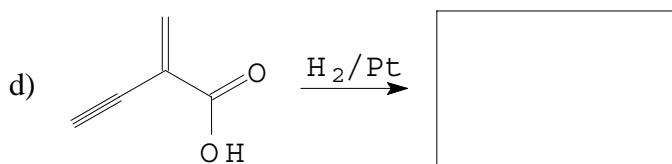
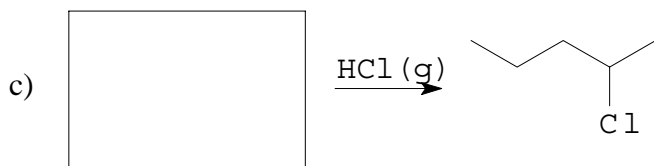
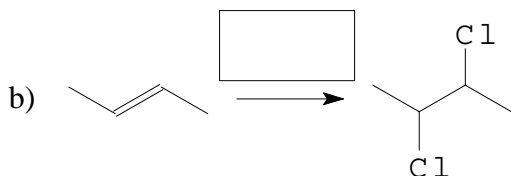
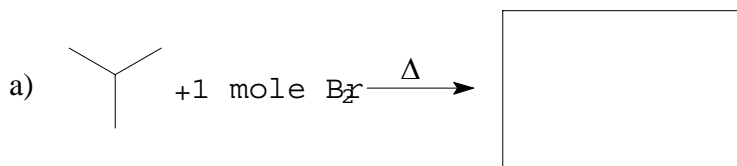
i) 4-phenylhexanamide

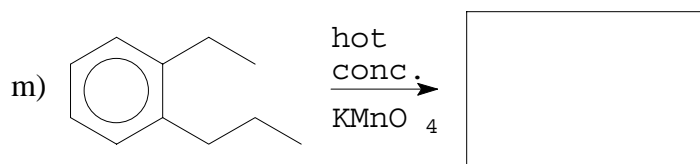
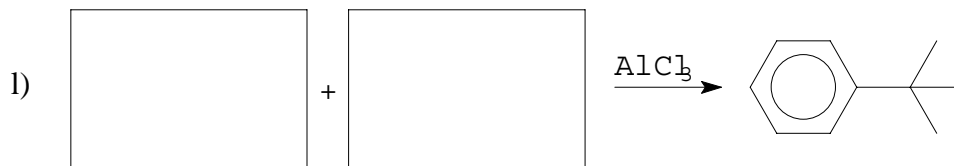
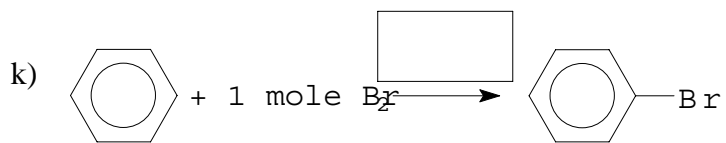
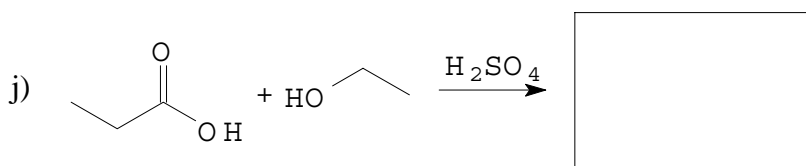
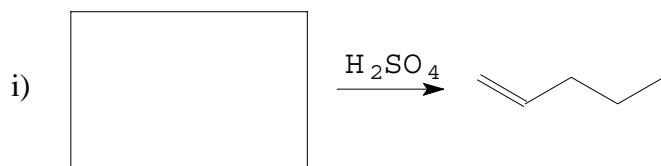
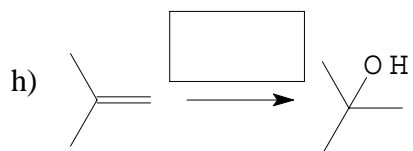
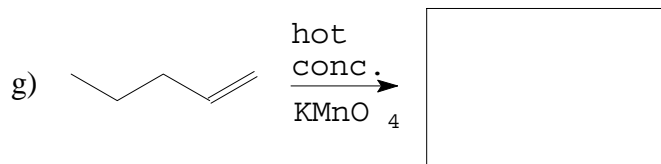
j) ethanoyl chloride

k) diisopropyl amine

l) m-chlorobenzoic acid

- 3) [26 marks] Fill in the missing information for the following reactions. Where products are required, show only the expected major organic product. Unless explicitly stated otherwise, all reagents are present in excess.





4) [2 marks] Show the steps necessary to synthesize:

a) 2-butanol from 1-butanol

b) propanone from propene

c) 2,3-butanedione from 2-butene

- 5) **[13 marks total]** There are five alcohols of formula  $C_5H_{10}O$  that do not contain a double bond or a three-membered ring and are skeletal or positional isomers of each other.
- a) **[2 marks]** Draw the five alcohols described above.
  
  - b) **[2 marks]** Pick a compound from (a) that will have at least one chiral carbon. Put an asterisk beside the chiral carbon atom or atoms.
  
  - c) **[2 marks]** Pick a compound from (a) that can exhibit geometric isomerism. Draw and label the cis and trans forms of the compound.
  
  - d) **[1 mark]** Pick a compound from (a) that has no primary carbon atoms.
  
  - e) **[1 mark]** Pick a compound from (a) that cannot have positional isomers.
  
  - f) **[1 mark]** Pick a compound from (a) that is a tertiary alcohol.
  
  - g) **[2 marks]** Give the structure of a saturated functional isomer of one of the compounds in (a).

6) **[8 marks total]** There are seven alcohols, ketones, and aldehydes of formula  $C_4H_8O$  that do *not* contain a carbon-carbon double bond.

a) **[2 marks]** Draw the seven compounds.

b) **[2 marks]** Which compound or compounds from (a) will not react with  $KMnO_4$ ?

c) **[1 mark]** Choose a compound from (a) that will react with  $H_2/Pt$  *and*  $KMnO_4$ .

d) **[1 mark]** Choose a compound from (a) that will react with only  $H_2/Pt$ .

**[2 marks]** Choose a compound from (a) that will react with neither  $H_2/Pt$  nor  $KMnO_4$ .

**Functional Group Priorities and Prefix/Suffix Labels**  
(in order of functional group priority)

<b>Compound Type</b>	<b>Prefix</b>	<b>Suffix</b>
<b>Carboxylic Acid</b>	N/A	oic acid
<b>Ester</b>	N/A	oate
<b>Amide</b>	N/A	amide
<b>Nitrile</b>	cyano	nitrile
<b>Aldehyde</b>	oxo	al
<b>Ketone</b>	oxo	one
<b>Alcohol</b>	hydroxy	ol
<b>Amine</b>	amino	amine
<b>Alkene</b>	enyl	ene
<b>Alkyne</b>	ynyl	yne
<b>Alkyl halide</b>	halo	N/A
<b>Ether</b>	oxy	ether

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