

Chemistry 1110 Spring 2024 Test 3

Wednesday, March 27, 2024

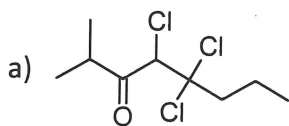
Time: 1 hour 50 minutes

Name: ANSWERS

Student #: _____

This test consists of **eight** pages of questions, a page containing functional group information, and a periodic table. Please ensure that you have a complete test and, if you do not, obtain one from me **immediately**. There are **87** marks available. Good luck!

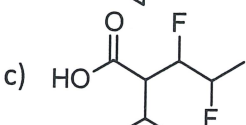
1) [18 marks] Give IUPAC (or other acceptable) names for the following compounds:



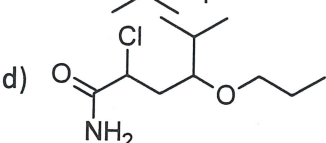
2-methyl-4,5,5-trichlorooctan-3-one



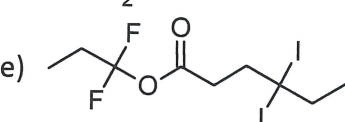
3,3-dicyclopropyl-5-methoxypentanal



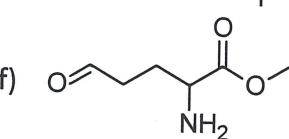
2-isopropyl-3,4-difluoropentanoic acid



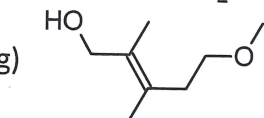
2-chloro-5-methyl-4-propoxyhexanamide



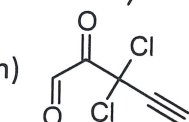
1,1-difluoropropyl 4,4-diiodohexanoate



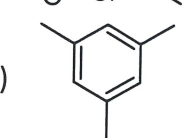
methyl 2-amino-5-oxopentanoate



trans-2,3-dimethyl-5-methoxypent-2-en-1-ol



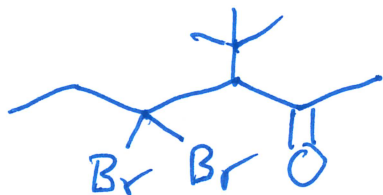
2-oxo-3,3-dichloropent-4-ynal



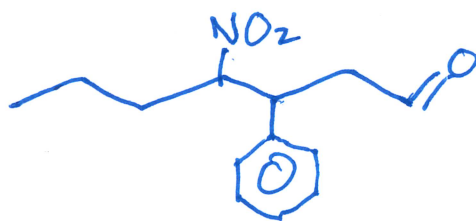
1,3,5-trimethylbenzene

2) [18 marks] Give structures consistent with the following names:

a) 4,4-dibromo-3-tert-butylhexan-2-one



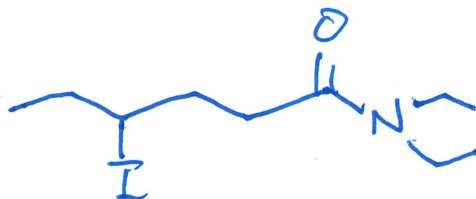
b) 4-nitro-3-phenylheptanal



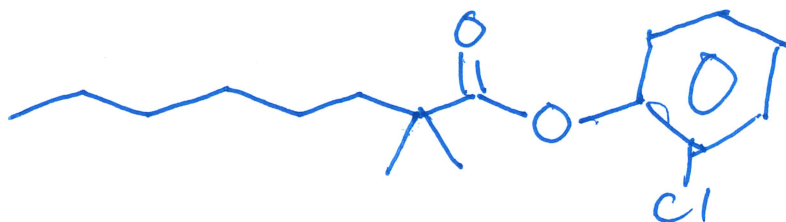
c) 5-ethoxy-3,3-difluoroheptanoic acid



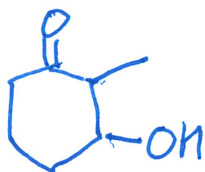
d) N,N-diethyl-4-iodohexanamide



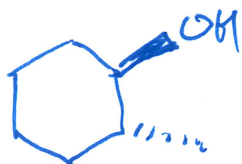
e) 2-chlorophenyl 2,2-dimethyloctanoate



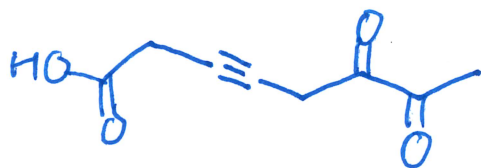
f) 3-hydroxy-2-methylcyclohexanone



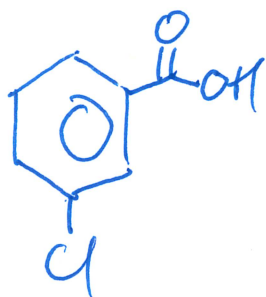
g) trans-2-methylcyclohexanol



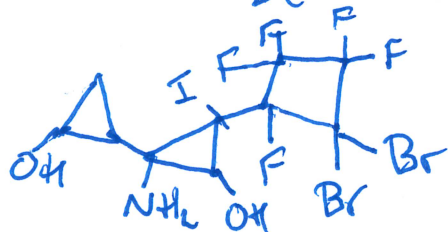
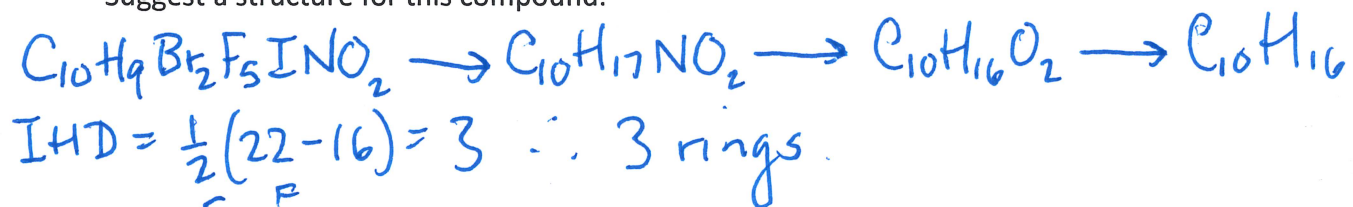
h) 6,7-dioxooct-3-ynoic acid



i) m-chlorobenzoic acid

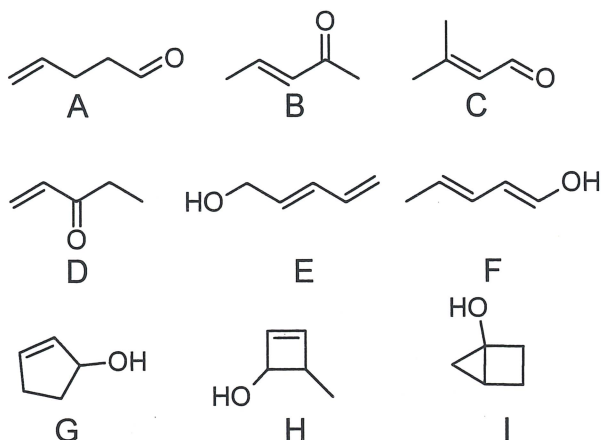


3) [3 marks] A compound containing only single bonds has the formula $C_{10}H_9Br_2F_5INO_2$. Suggest a structure for this compound.



(many other possibilities)

4) [14 marks] Shown below are some compounds of formula C_5H_8O :



Give the letter or letters (as required) of compounds that match the description given. You do not need to name the compounds.

a) Identify two primary alcohols.

E, F

b) Identify a compound that will react with neither H_2 nor $KMnO_4$.

I

c) Identify two compounds that are **only** functional isomers of each other.

A, D differ only in position (+ function) of $C=O$.

d) Identify two compounds that are **only** positional isomers of each other.

B & D or E & F

e) Identify two compounds that have **two** stereogenic centres.

H, I

f) Identify all the compounds that **cannot** have geometric isomers.

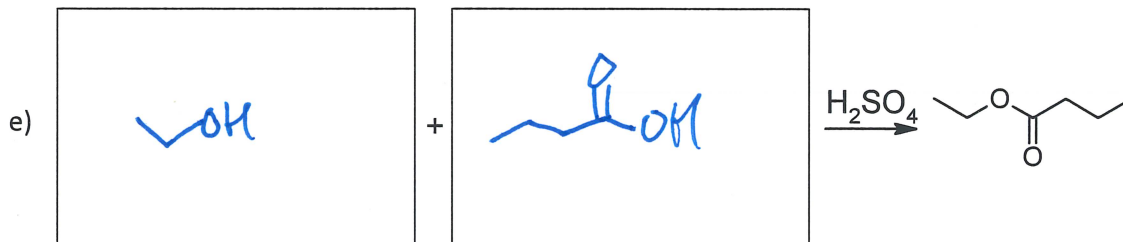
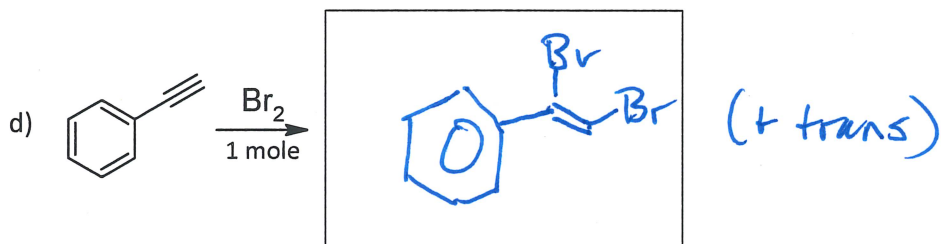
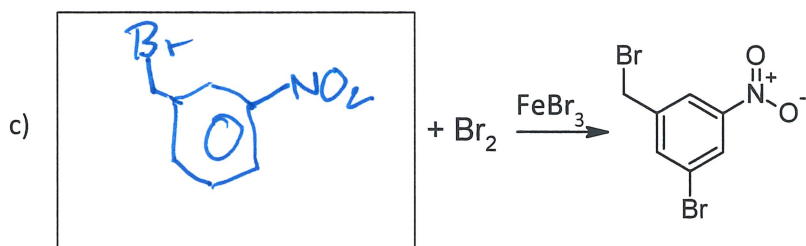
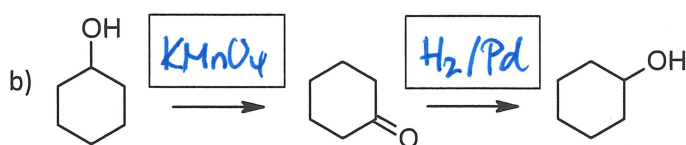
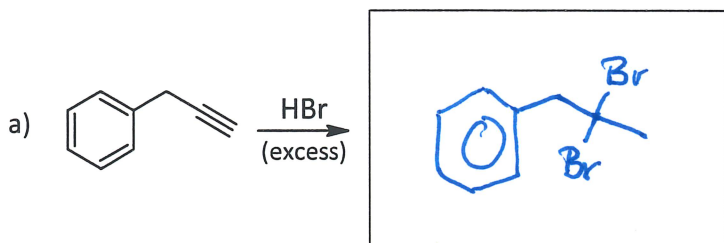
A, C, D, G + ~~some of~~ I

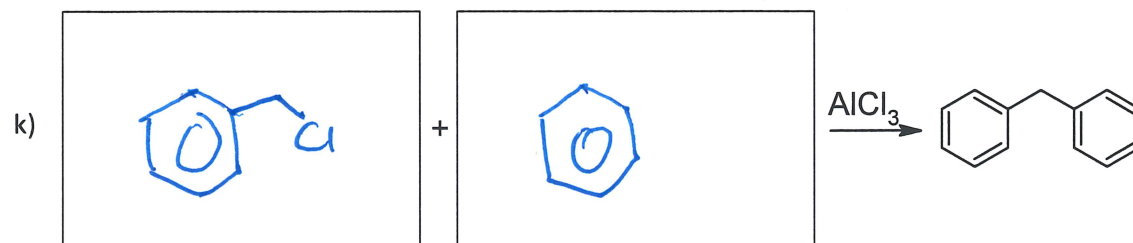
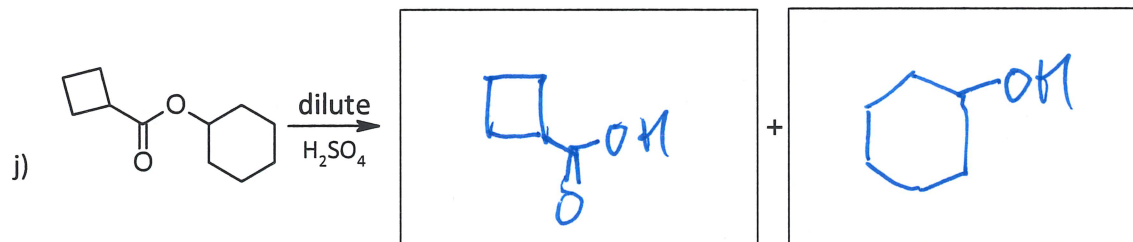
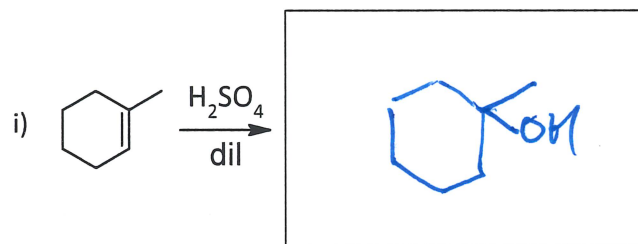
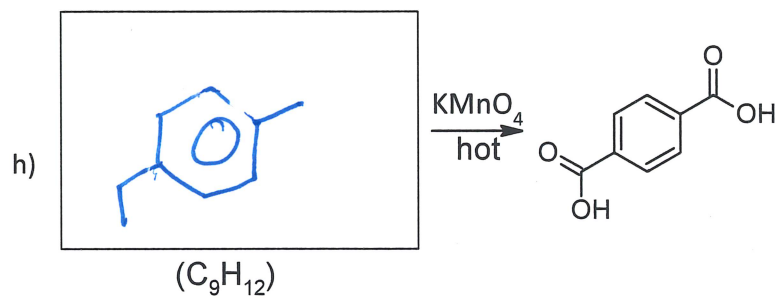
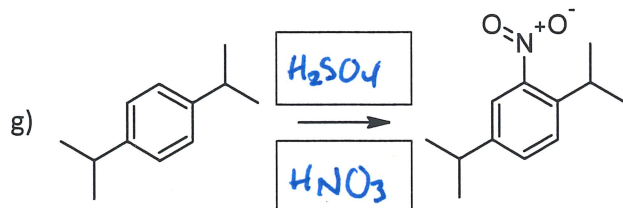
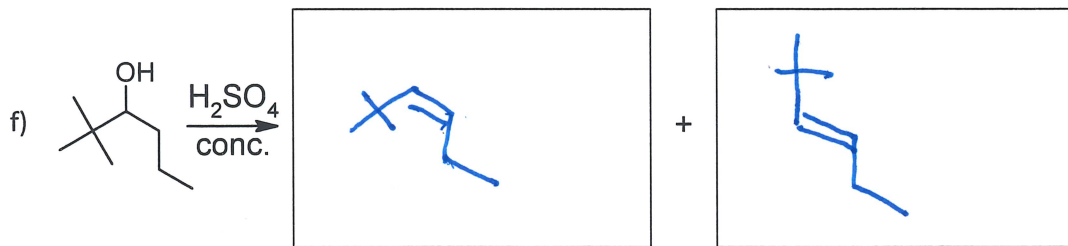
g) Identify two compounds that are positional isomers of each other.

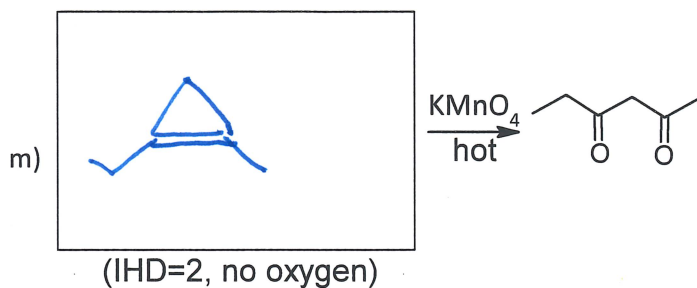
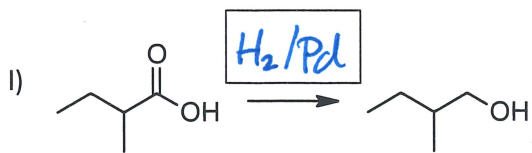
E + F

5) [18 marks] Fill in the missing information in the reactions below. For any structure, you may show either all the atoms (e.g. $\begin{array}{c} \text{H} & \text{H} & \text{H} & \text{H} \\ | & | & | & | \\ \text{H}-\text{C} & -\text{C} & -\text{C} & -\text{H} \\ | & | & | & | \\ \text{H} & \text{H} & \text{H} & \text{H} \end{array}$) or use the abbreviation (e.g. $\text{—}\text{C}\text{—}$), but you may not mix the two styles within a single structure. You may switch between the two different styles for different answers. You do not need to name the structures you draw.

Please note: Neatness counts! If I can't tell what you've drawn, I'll mark it wrong.





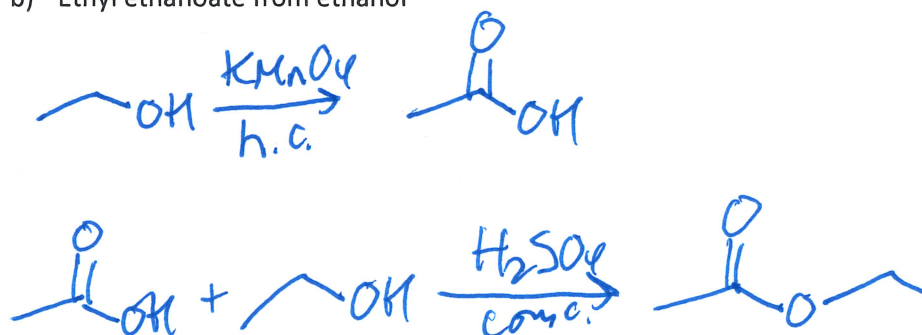


6) [4 marks] Synthesize:

a) Chloroethane from ethanol



b) Ethyl ethanoate from ethanol



- 7) [9 marks] Complete the table. The central atom is underlined; all other atoms are bonded only to it. The Lewis structure drawn must be the best possible one for the species. Only your responses in the boxes will be marked.

Formula	Lewis structure	Name for shape	Polar (yes/no)
<u>Xe</u> F ₂	<pre> :F: :Xe: :F: </pre>	linear	no
<u>P</u> O ₃ ³⁻	<pre> .. P / \ :O: :O: \ / :O: </pre>	trigonal Pyramid	yes
<u>S</u> F ₃ ⁻¹	<pre> :F: :S-:F: :F: </pre>	t-shaped	yes

- 8) [3 marks] Match the melting points (-138°C, -114°C, -82°C) to their compounds:

ethanamine -82 dimethyl ether -138 ethanol -114