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Answers

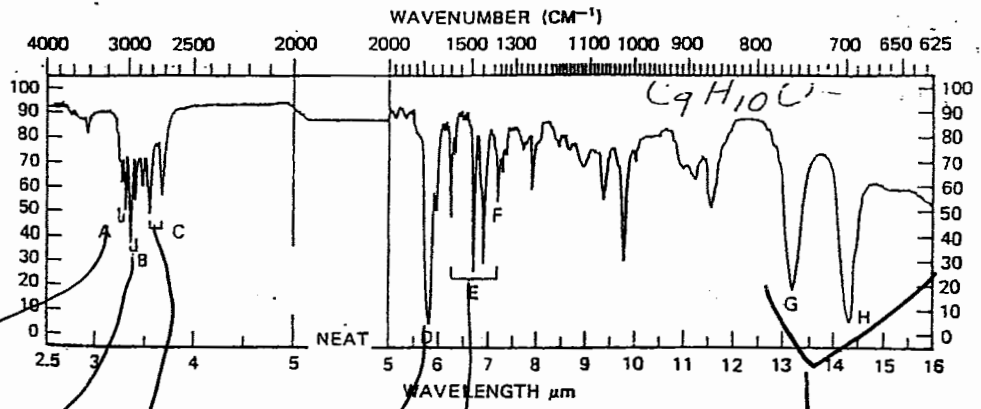
Name: _____
Chem 211 Lab
M. Nerz

Date: _____
Test 1
Fall 2009

- 1.
- 2.
- 3.
- 4.
- 5.

Please take no more than 120 minutes to complete the following problems. This test is closed book. You can use the enclosed tables to help solve the spectral problems.

1. An unknown compound has the formula $C_9H_{10}O$. The IR spectrum is given below. Using the IR table included in this packet, interpret the labeled peaks (those marked with letter designations) in the spectrum. Write one structure that is consistent with you fragments. (12 points)



$sp^2 C-H$
 $sp^3 C-H$

aldehyde C-H

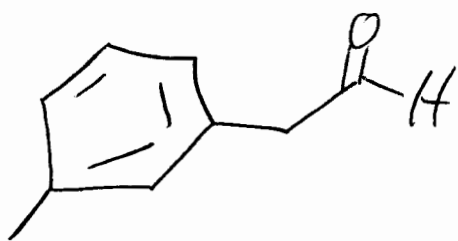
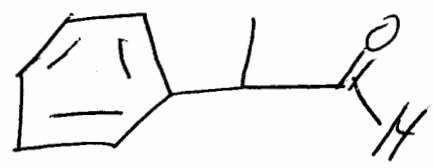
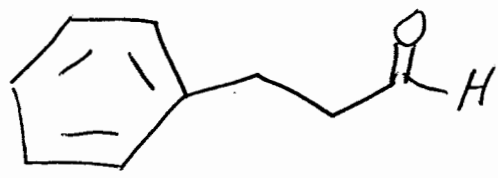
$C=O$
 stretch

aromatic $C=C$
 stretching

$C-H$ bending
 meta or mono substituted
 Aromatic

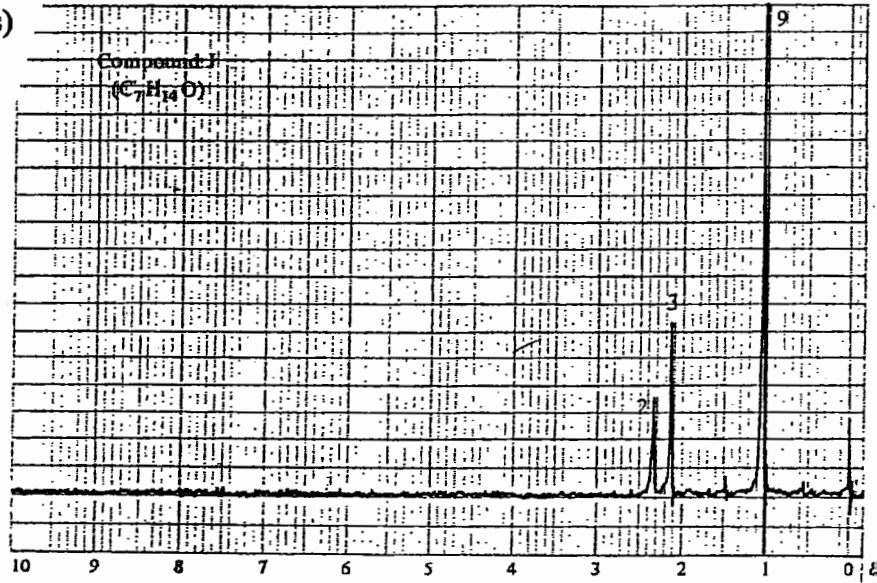
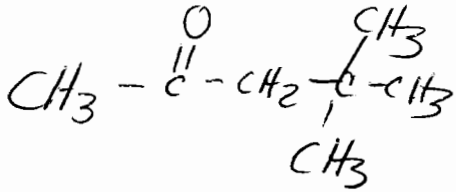
$C_9H_{10}O$
 C_9H_{10}
 $\frac{10}{2} = 5$

A few good answers

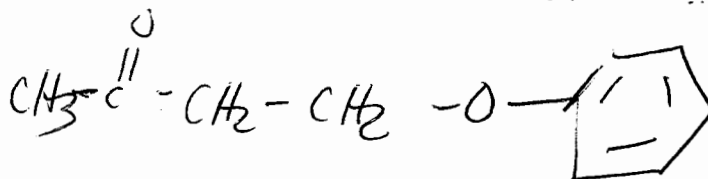
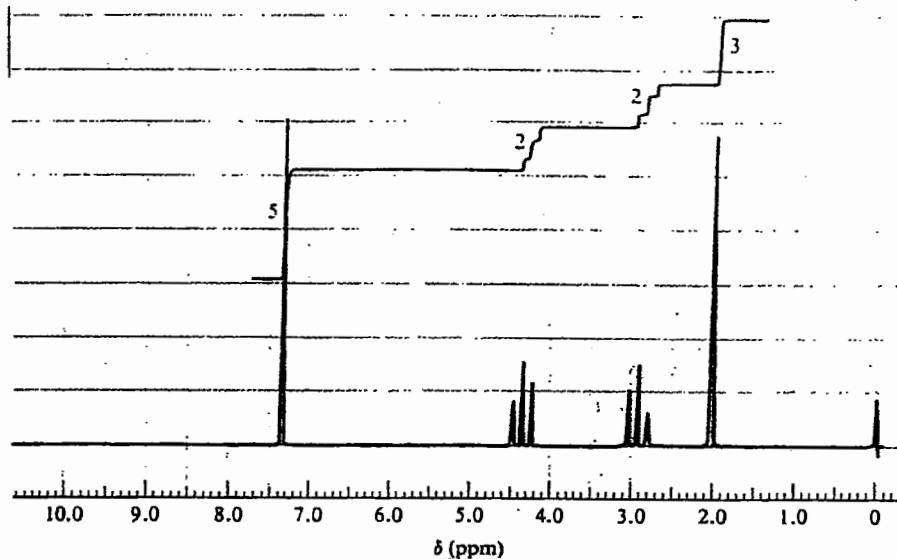


2. An unknown compound having the formula $C_7H_{14}O$ gives the following 1H NMR spectrum. Suggest a reasonable structure for the unknown compound, but be sure to show your work (12 points)

Best Answer



3. An unknown compound having the formula $C_{10}H_{12}O_2$ is studied by 1H NMR and IR spectroscopy. The IR measurements reveal that the compound absorbs strongly at 1710 cm^{-1} . The 1H NMR spectrum is given below. Fully interpret the given information and propose the structure on the unknown compound. Generous partial credit will be given for structural fragments. (12 points)

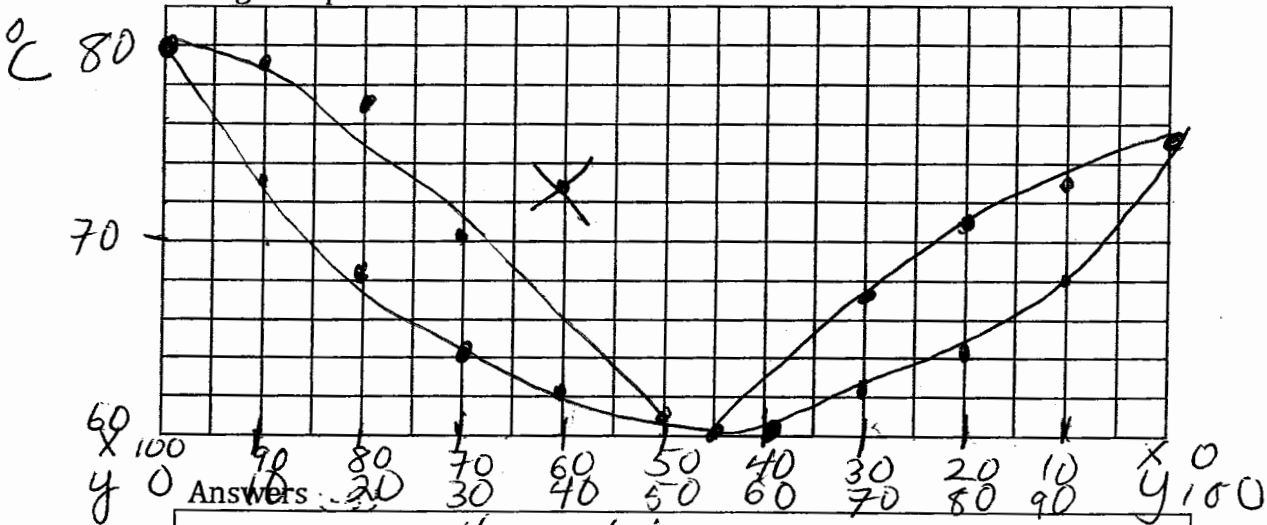


4. Using the melting point data given below, construct a "rough" melting point composition diagram. What is the eutectic composition? Which composition truly has the broader melting point, 90:10, X:Y or 70:30, X:Y? Explain in terms of the equilibria involved. Try to keep your answer in the box provided. (24 points)

Composition (X%:Y%)	melting point range $^{\circ}\text{C}$
100:0	80.0-80.5
90:10	73.0-79.0
80:20	68.0-77.0
70:30	64.0-70.0
60:40	62.0-73.0
50:50	61.0-68.0
40:60	60.0-60.5
30:70	62.0-67.0
20:80	64.0-71.0
10:90	68.0-73.0
0:100	75.0-75.5

eutectic

Rough Graph:



40:60 is the eutectic.

Very simply - All crude ~~same~~ samples start melting as eutectics in the eutectic proportion (eutectic defines solubility)

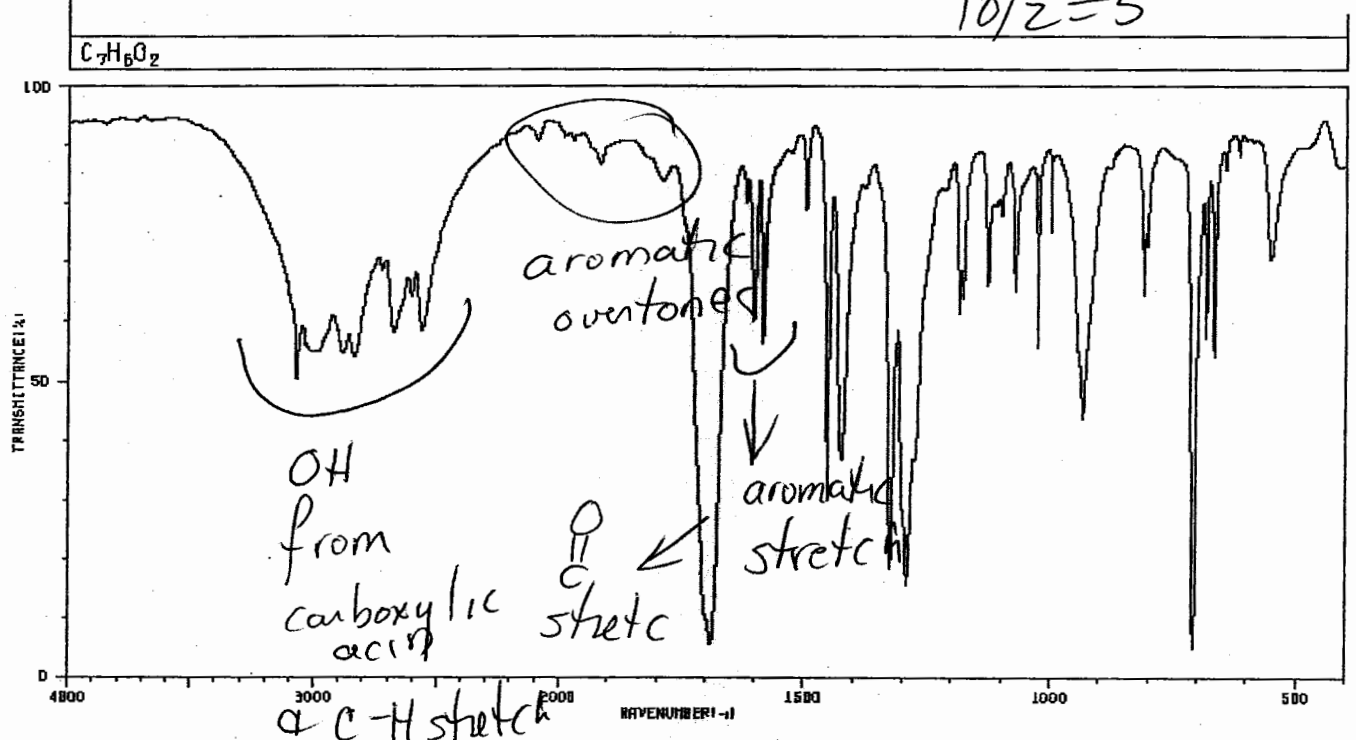
$^{\circ}\text{C}$ 90:10 has the broader m.p range because it starts melting at 60 & is not done until almost the beginning of melting is not observed in a pure sample until late in the game because the

Woops! quantity of the eutectic is very small
 Small amount of eutectic ~~is~~ small eutectic soln.

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5. By evaluating the formula ($C_7H_6O_2$) and landscape ("topography") of this spectrum, can you write the structure? Write one structure that you believe is consistent with this image. (12 points)

$C_7H_6O_2$
 $C_7H_6O_2$
 $\frac{10}{2} = 5$



Shown in class 2X

