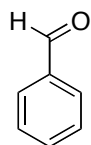


Chem 334, Exam 1
Professor Fox

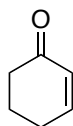
Spring 2007

Your Name_____

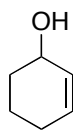
1. Match the following to their IR spectra (30 points)



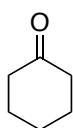
e



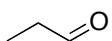
d



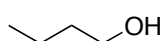
c



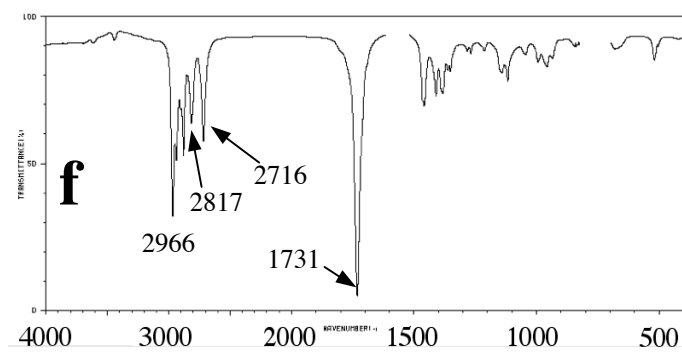
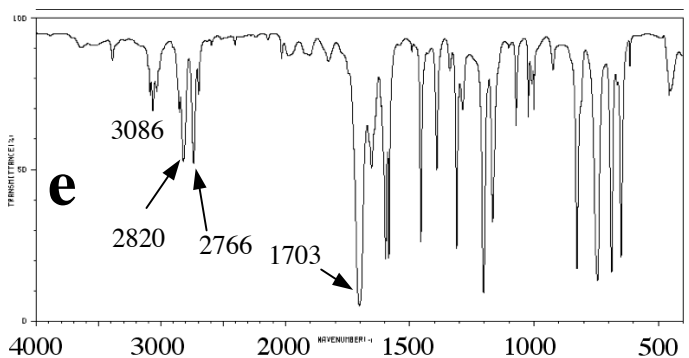
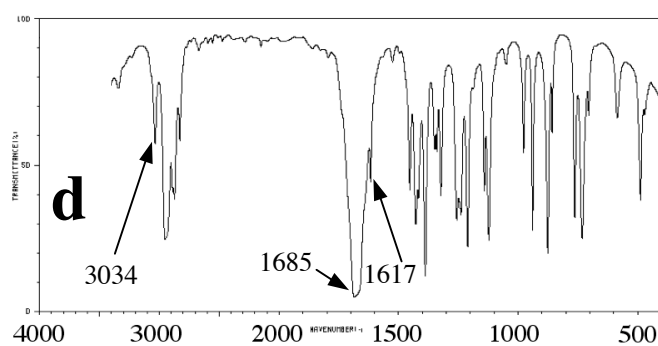
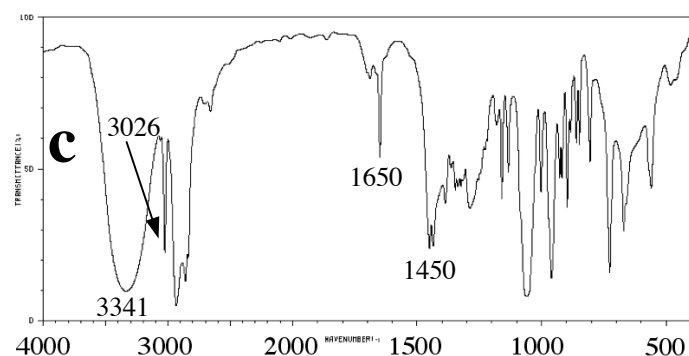
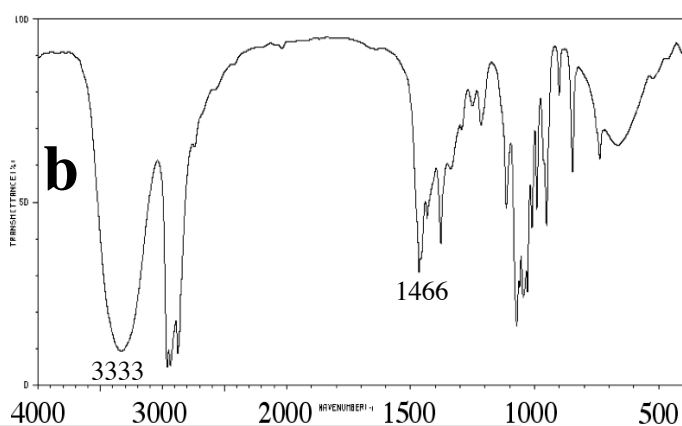
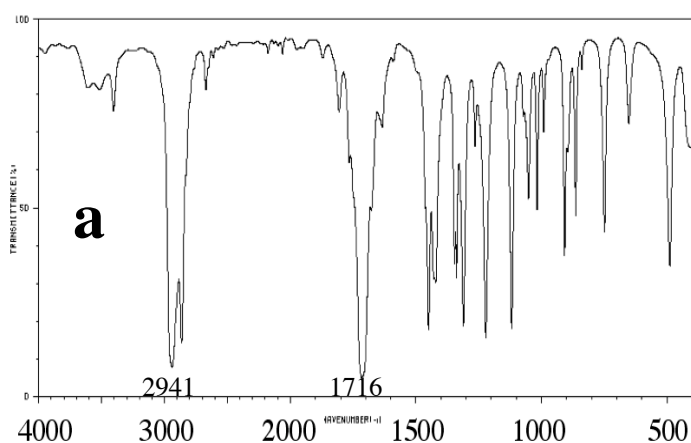
a



f

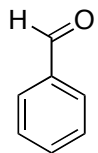


b

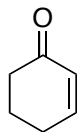


2. Match the following NMR spectra with one of the following substances. Write your answer in the box along side the spectrum

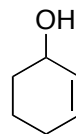
(16 points)



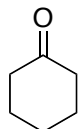
A



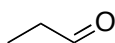
B



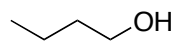
C



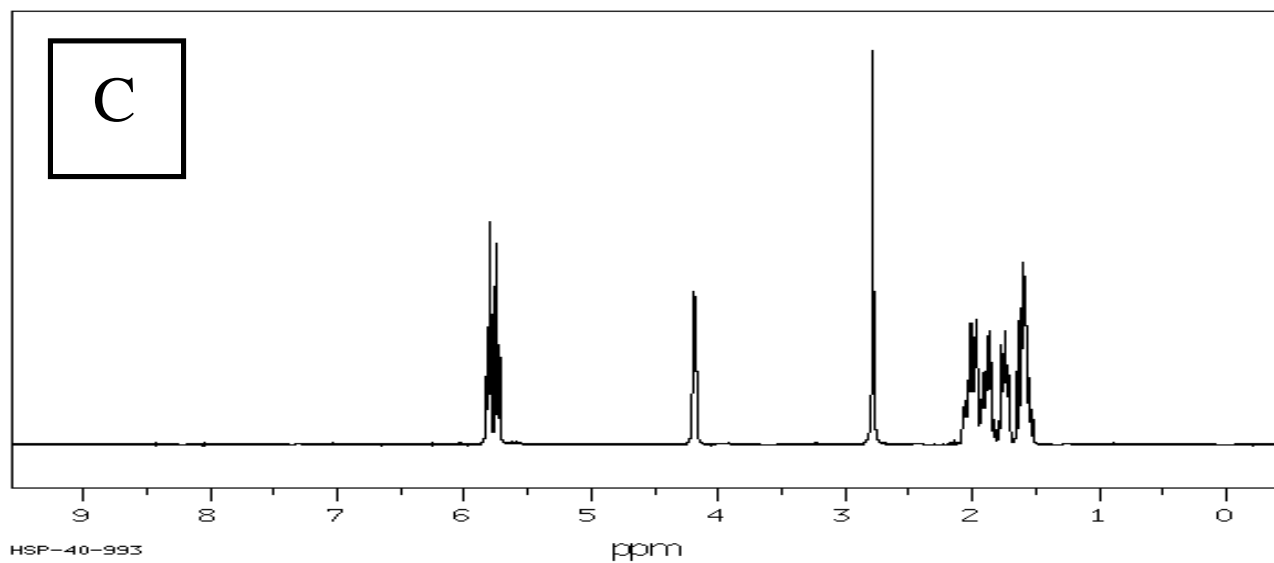
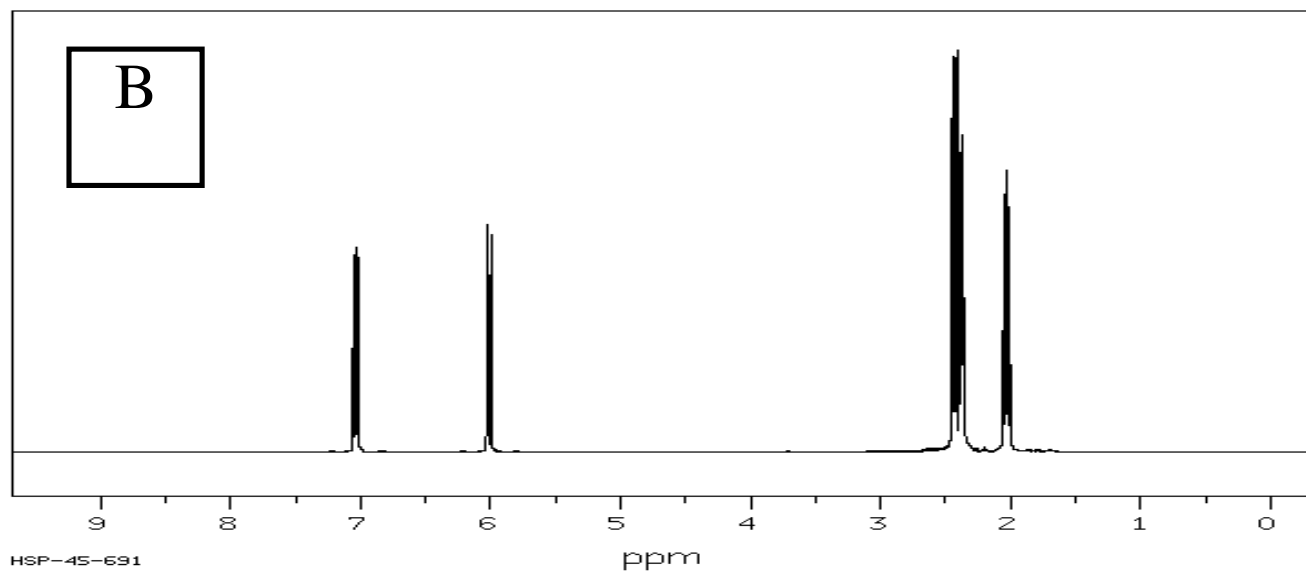
D



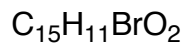
E



F



3. Elucidate the following structure



^1H NMR

7.93 (d, $J = 7.5$ Hz, 1H),
 7.58 (d, $J = 7.6$ Hz, 2H),
 7.52 (t, $J = 8.0$ Hz, 1H)
 7.36 (d, $J = 7.6$ Hz, 2H),
 7.09-7.05 (m, 2H)
 5.45 (dd, $J = 13.3, 2.6$ Hz, 1H)
 3.00 (dd, $J = 16.8, 13.3$ Hz, 1H)
 2.88 (dd, $J = 16.8, 2.6$ Hz, 1H)

^{13}C NMR

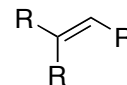
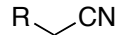
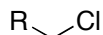
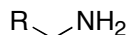
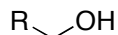
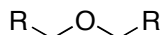
196 (s)
 162 (s)
 138 (s)
 136 (d)
 132 (d) (2 carbons)
 128 (d) (2 carbons)
 127 (d)
 123 (s)
 122 (s)
 121 (d)
 118 (d)
 79 (d)
 44 (t)

IR: 1692, 1605, 1465 cm^{-1}

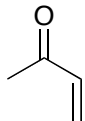
a) Circle the functional group that is associated with

(i) IR: 1692 cm^{-1} (9 points)

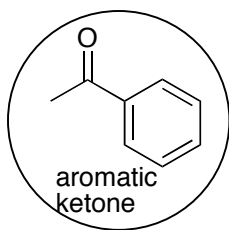
alkane



aliphatic
ketone



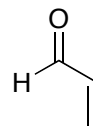
α,β -unsaturated
ketone



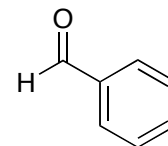
aromatic
ketone



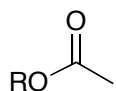
aliphatic
aldehyde



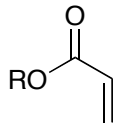
α,β -unsaturated
aldehyde



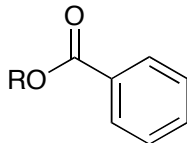
aromatic
aldehyde



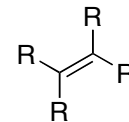
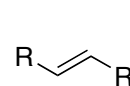
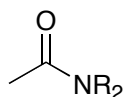
aliphatic
ester



α,β -unsaturated
ester



aromatic
ester



3. Elucidate the following structure

$C_{15}H_{11}BrO_2$

continued

1H NMR

7.93 (d, $J = 7.5$ Hz, 1H),
7.58 (d, $J=7.6$ Hz, 2H),
7.52 (t, $J = 8.0$ Hz, 1H)
7.36 (d, $J=7.6$ Hz, 2H),
7.09-7.05 (m, 2H)
5.45 (dd, $J = 13.3, 2.6$ Hz, 1H)
3.00 (dd, $J = 16.8, 13.3$ Hz, 1H)
2.88 (dd, $J = 16.8, 2.6$ Hz, 1H)

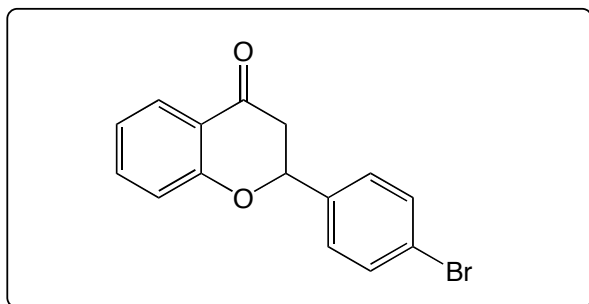
^{13}C NMR

196 (s)
162 (s)
138 (s)
136 (d)
132 (d) (2 carbons)
128 (d) (2 carbons)
127 (d)
123 (s)
122 (s)
121 (d)
118 (d)
79 (d)
44 (t)

IR: 1692, 1605, 1465 cm^{-1}

b) draw the structure of the product (no partial credit)

(25 points)



c. Assign the following coupling constants: (20 points)

5.45 (dd, $J = 13.3, 2.6$ Hz, 1H)
3.00 (dd, $J = 16.8, 13.3$ Hz, 1H)
2.88 (dd, $J = 16.8, 2.6$ Hz, 1H)

