NMR Practice Problem Set I
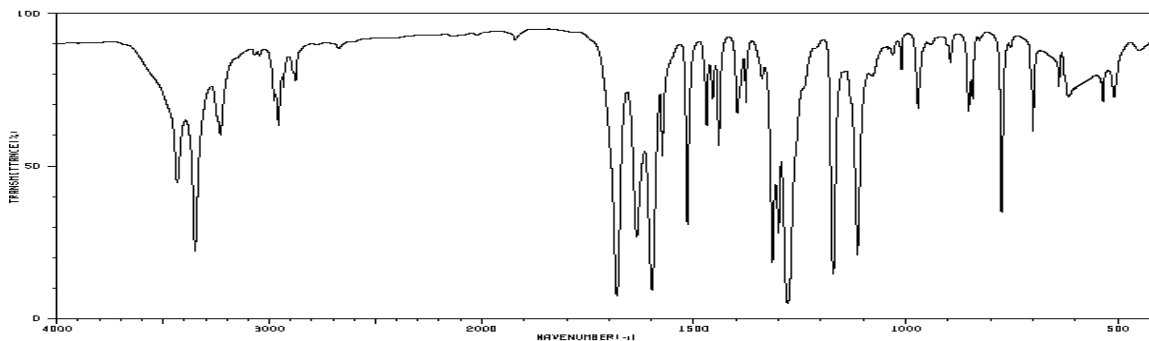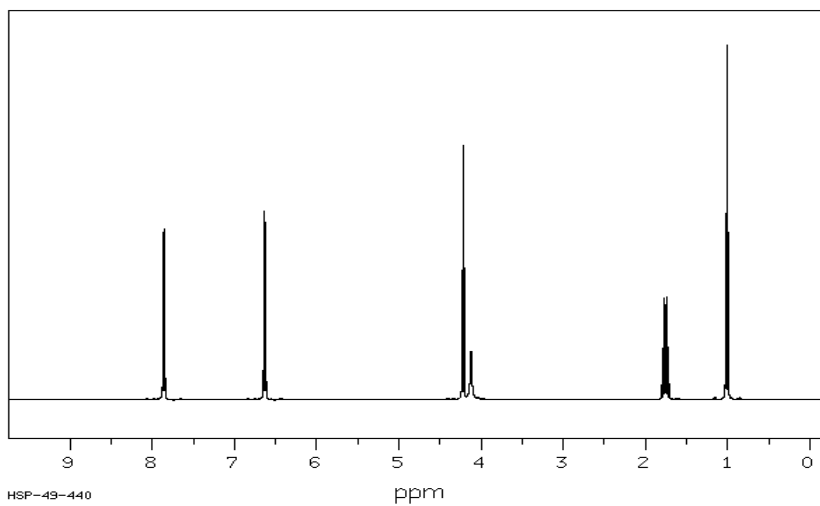
Fall 2014

1. Compound **W** has an empirical formula of $C_{10}H_{13}NO_2$. Given are the following spectra.

   a. Determine the degree of unsaturation for the compound.

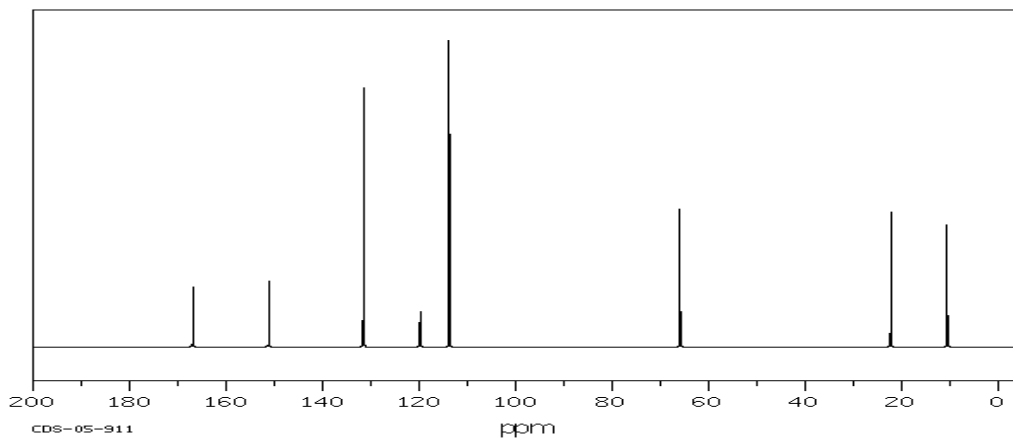   b. Assign five pertinent peaks in the infrared spectrum.

   c. Suggest a structure for compound W based on the spectra given. **Show all your work and clearly indicate what your final answer is**.
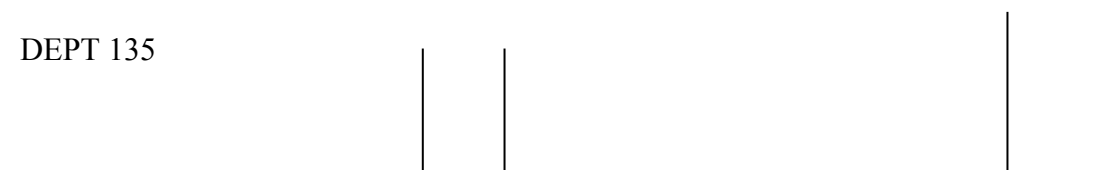

HSP-49-440

Integration	2	2	2 2	2	3
Multiplet	d	d	t s	"m"	t

CDS-0S-911

DEPT 135

DEPT 90

DEPT 45

# of attached hydrogens	0	1	2	3
DEPT 135	0	up	down	up
DEPT 90	0	up	0	0
DEPT 45	0	up	up	up

Final Answer

3

Winter 2008

2. Compound **W** has an empirical formula of $C_{10}H_{11}NO_4$. Given are the following spectra.

   a. Determine the degree of unsaturation for the compound.

   b. Assign the five pertinent peaks in the infrared spectrum.

   c. Suggest a structure for compound W based on the spectra given. **Show all your work and clearly indicate what your final answer is**.
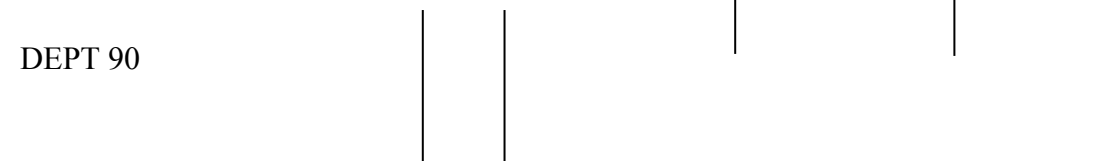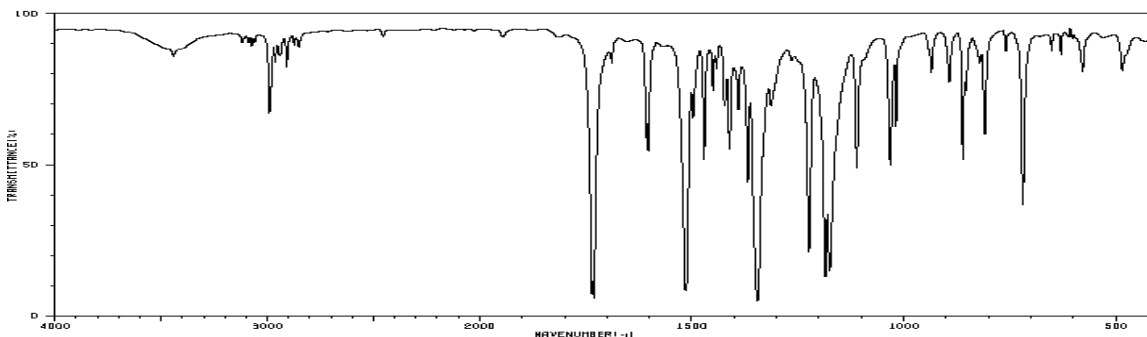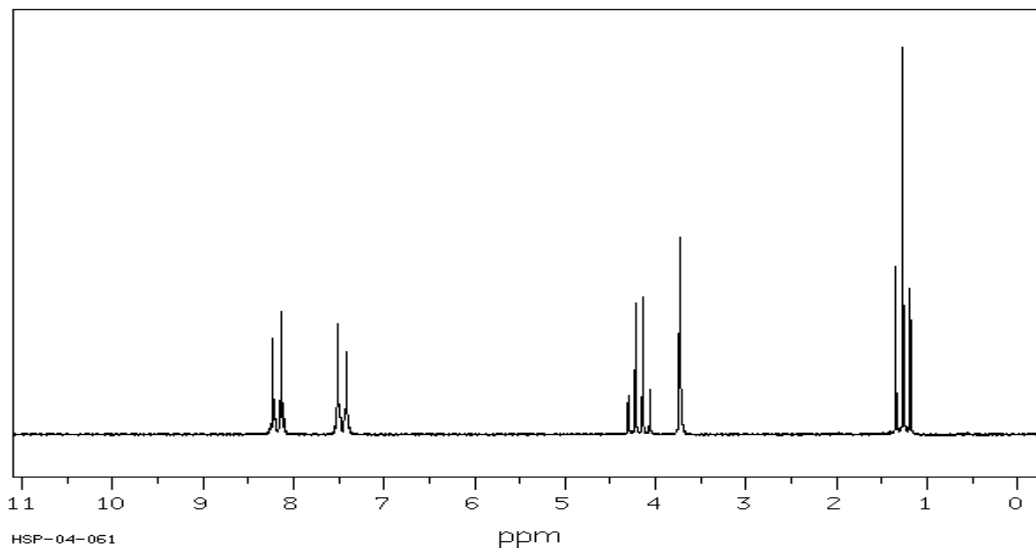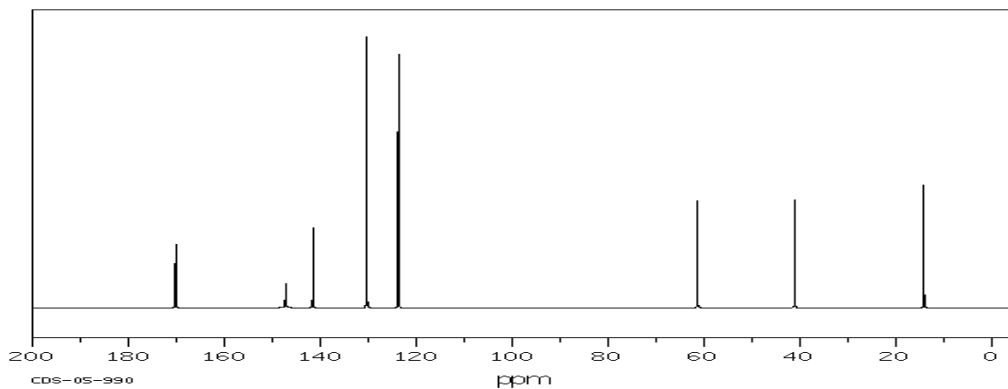

HSP-04-061

ppm

Integration   2   2   2   2   3

4

CDS-05-990

DEPT 135

DEPT 90

DEPT 45

# of attached hydrogens	0	1	2	3
DEPT 135	0	up	down	up
DEPT 90	0	up	0	0
DEPT 45	0	up	up	up

Final Answer
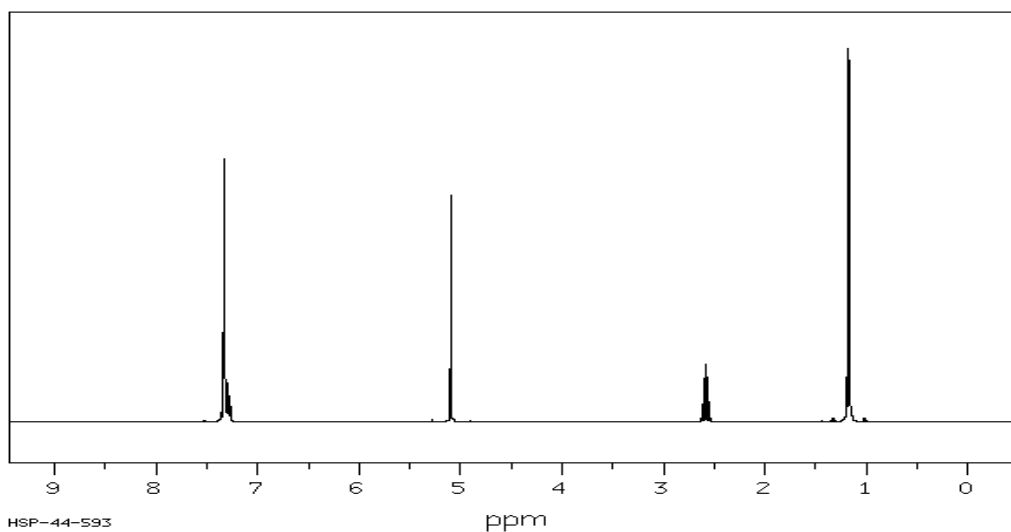
3. Compound **W** has an empirical formula of $C_{11}H_{14}O_2$. Given are the following spectra.

    a. Determine the degree of unsaturation for the compound.

    b. Assign the five pertinent peaks in the infrared spectrum.

    c. Suggest a structure for compound W based on the spectra given. **Show all your work**. **Place your final answer in the box provided below. Only a molecule placed is this box will receive credit!**
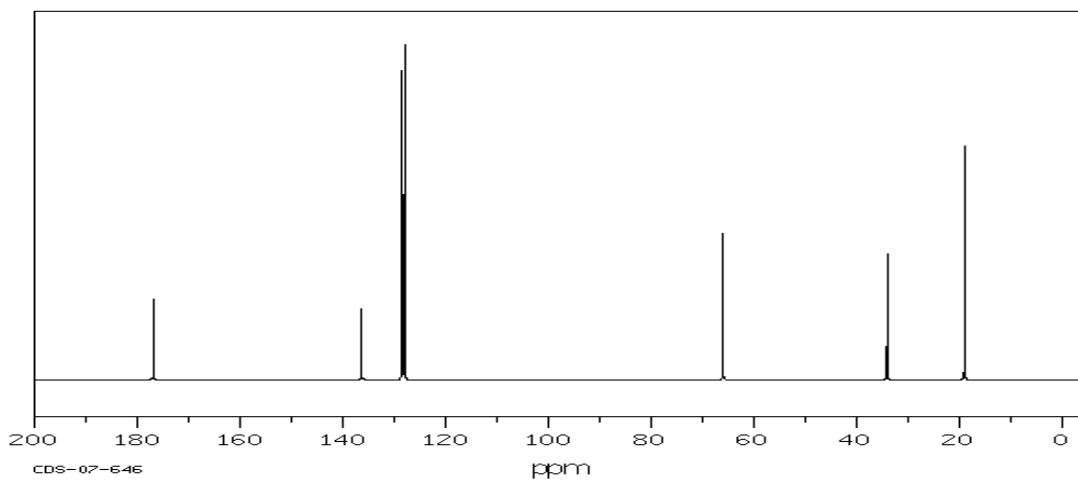

HSP-44-593

Integration	5	2	1	6

CDS-07-646

DEPT 135

DEPT 90

DEPT 45

Note: The signal group at 128 ppm is comprised of two tall and one medium sized signal.

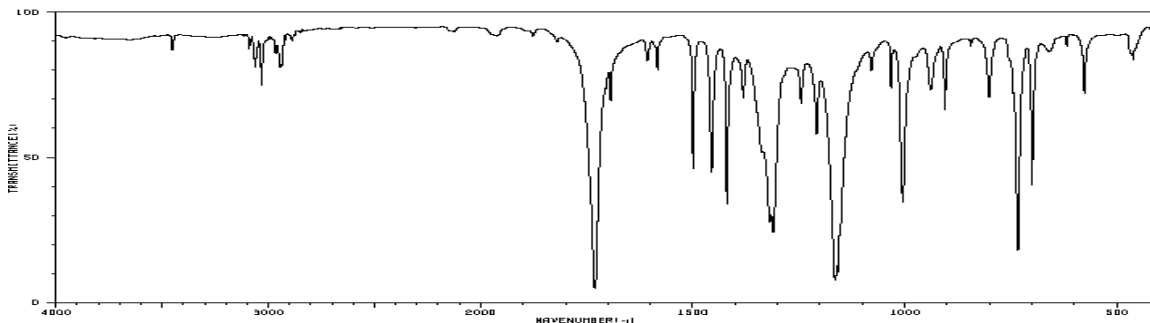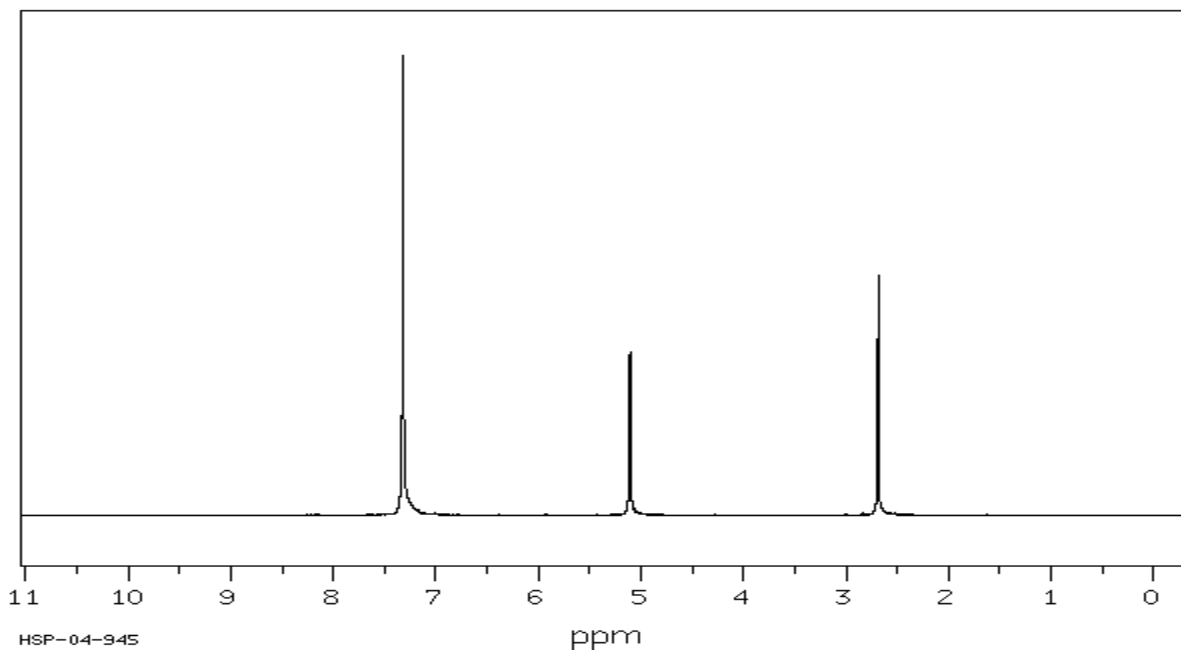| # of attached hydrogens	0	1	2	3
DEPT 135	0	up	down	up
DEPT 90	0	up	0	0
DEPT 45	0	up	up	up

Final Answer

Summer 2008

4. Compound **W** has an empirical formula of $C_{18}H_{18}O_4$. Given are the following spectra. **Show all your work**.

    a. Determine the degree of unsaturation for the compound.

    b. Assign the five pertinent peaks in the infrared spectrum.

    c. Suggest a structure for compound **W** based on the spectra given. **Place your final answer in the box provided below. Only a molecule placed is this box will receive credit!**
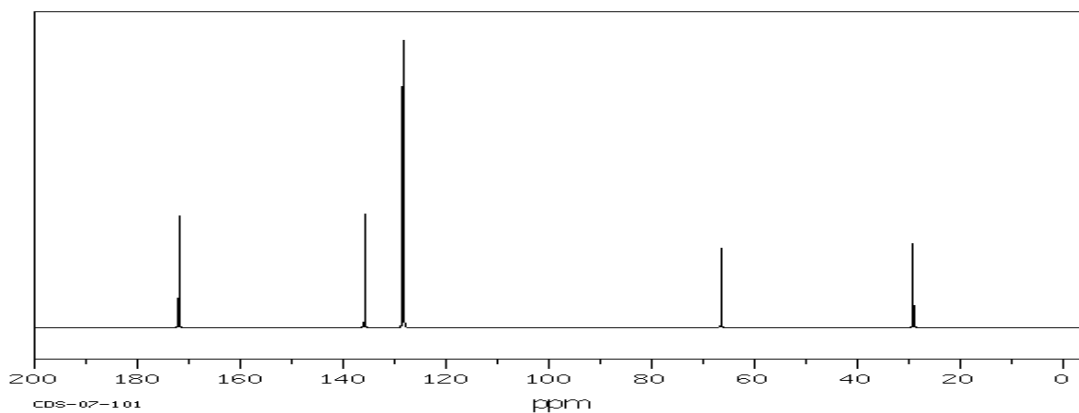

HSP-04-945

ppm

Integration   **5**   **2**   **2**

8

CDS-07-101

DEPT 135

DEPT 90

DEPT 45

Note: The signal group at 128 ppm is comprised of two tall and one medium sized signal.

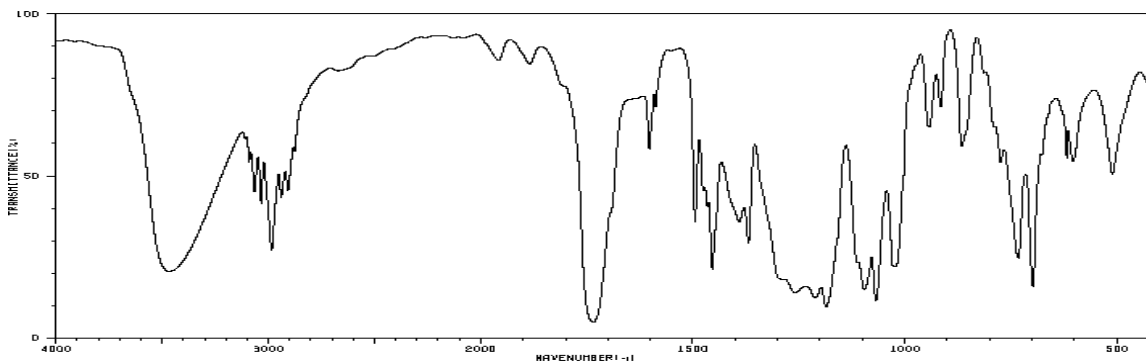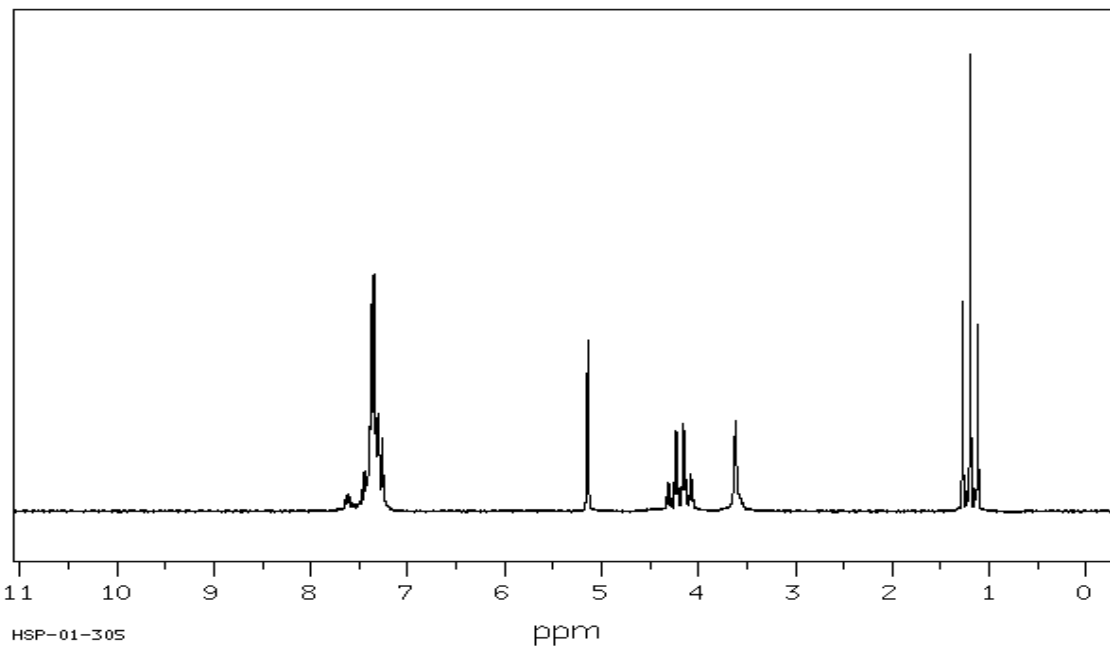| # of attached hydrogens	0	1	2	3
DEPT 135	0	up	down	up
DEPT 90	0	up	0	0
DEPT 45	0	up	up	up

Final Answer

9

5. Compound **W** has an empirical formula of $C_{10}H_{12}O_3$. Given are the following spectra. **Show all your work**.

    a. Determine the degree of unsaturation for the compound.

    b. Assign the five pertinent peaks in the infrared spectrum.

    c. Suggest a structure for compound **W** based on the spectra given. **Place your final answer in the box provided below. Only a molecule placed is this box will receive credit!**
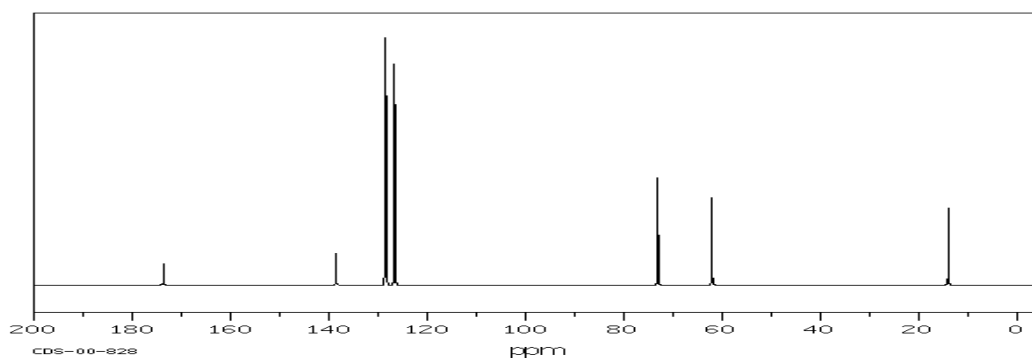

HSP-01-305

Integration   **5**   **1**   **2** **1**   **3**
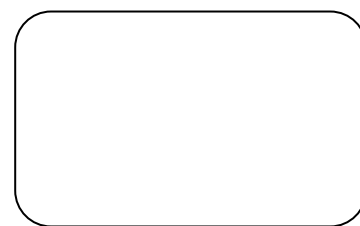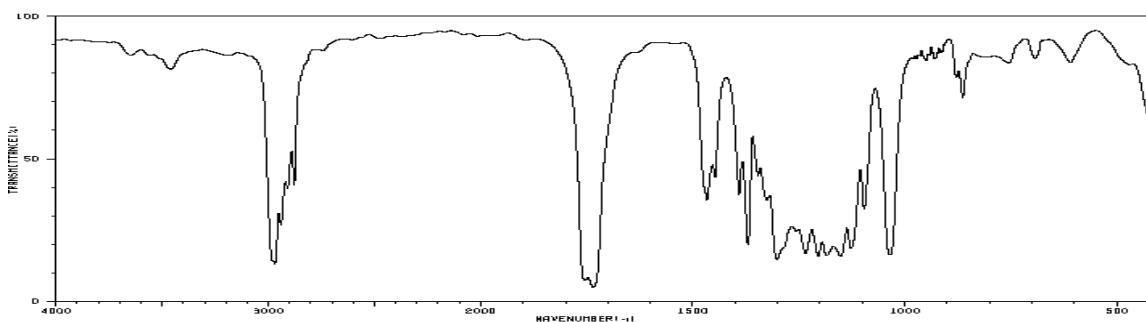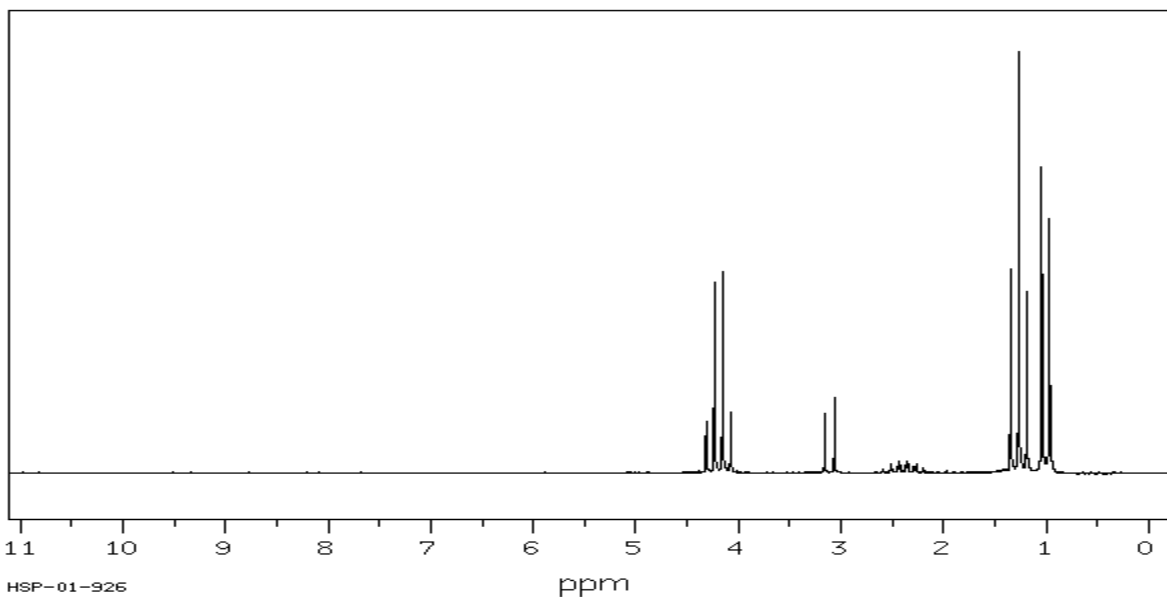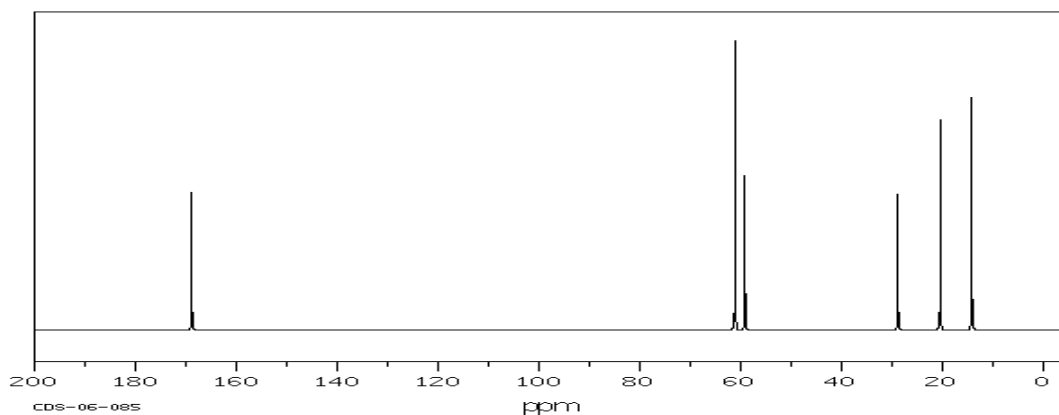
CDS-00-828

DEPT 135

DEPT 90

DEPT 45

Note: The signal group at 128 ppm is comprised of one tall and one medium sized signal (see DEPT).

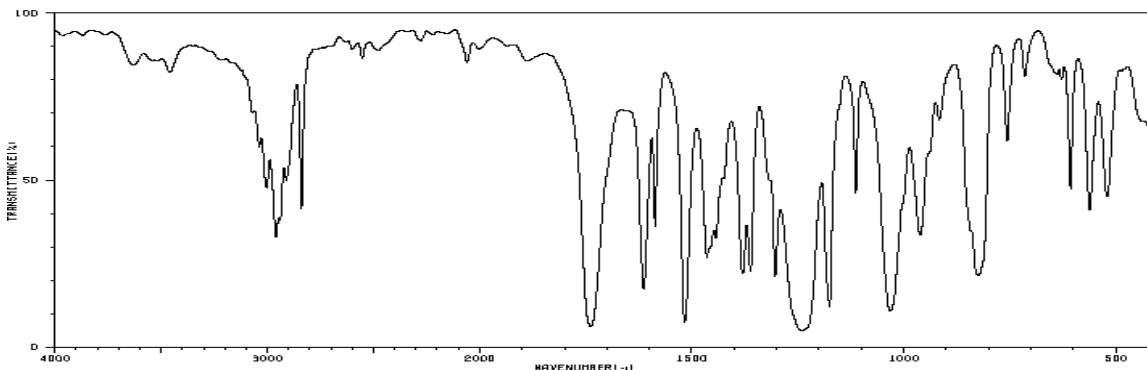| # of attached hydrogens	0	1	2	3
DEPT 135	0	up	down	up
DEPT 90	0	up	0	0
DEPT 45	0	up	up	up

Final Answer

11

6. Compound **W** has an empirical formula of $C_{10}H_{18}O_4$. Given are the following spectra. **Show all your work**.

   a. Determine the degree of unsaturation for the compound.

   b. Assign the four pertinent peaks in the infrared spectrum.

   c. Suggest a structure for compound **W** based on the spectra given. **Place your final answer in the box provided below. Only the molecule placed is this box will receive credit!**

HSP-01-926

ppm

Integration   **4**   **1**   **1**   **6 6**

CDS-06-085

DEPT 135

DEPT 90

DEPT 45

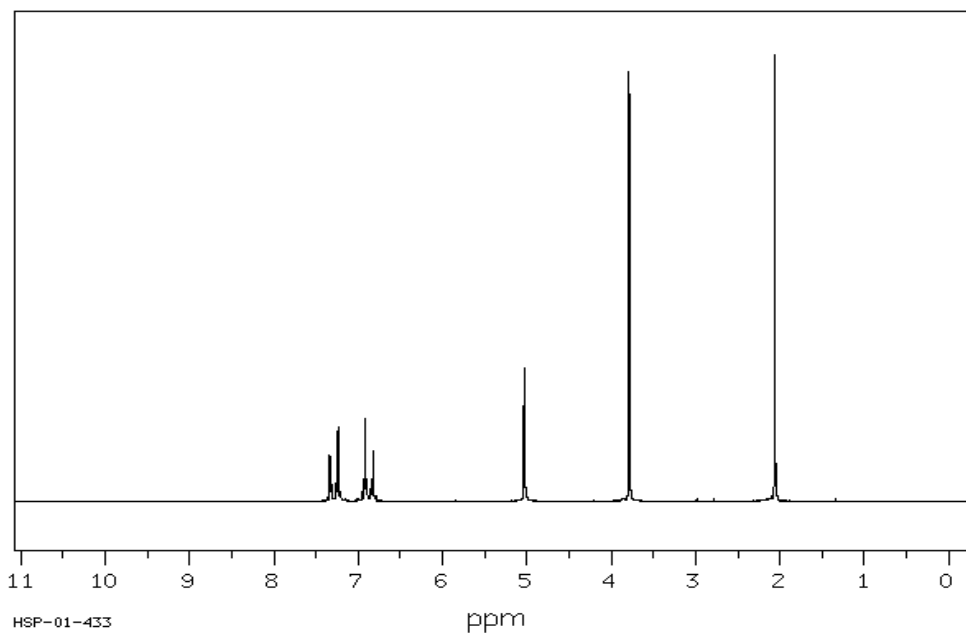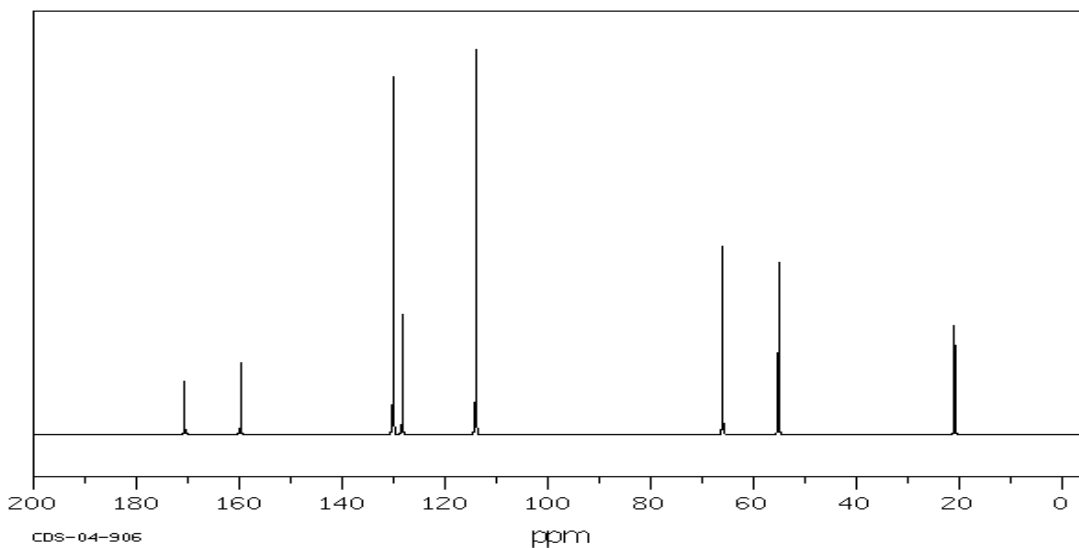| # of attached hydrogens	0	1	2	3
DEPT 135	0	up	down	up
DEPT 90	0	up	0	0
DEPT 45	0	up	up	up

Final Answer

7. Compound **W** has an empirical formula of $C_{10}H_{12}O_3$. Given are the following spectra. **Show all your work** (= label peaks in the spectra!)

   a. Determine the degree of unsaturation for the compound.

   b. Assign the five pertinent peaks in the infrared spectrum.

   c. Suggest a structure for compound **W** based on the spectra given. **Place your final answer in the box provided below. Only the molecule placed is this box will receive credit! Partial structures and structures, which do not meet the molecular formula, will not any receive credit.**

HSP-01-433

ppm

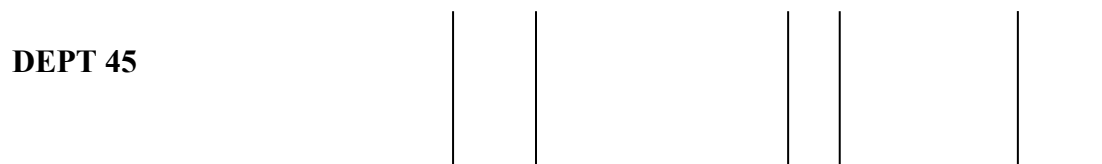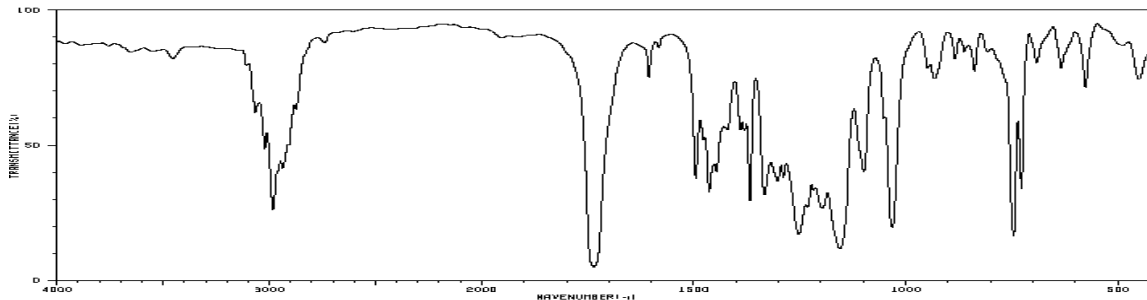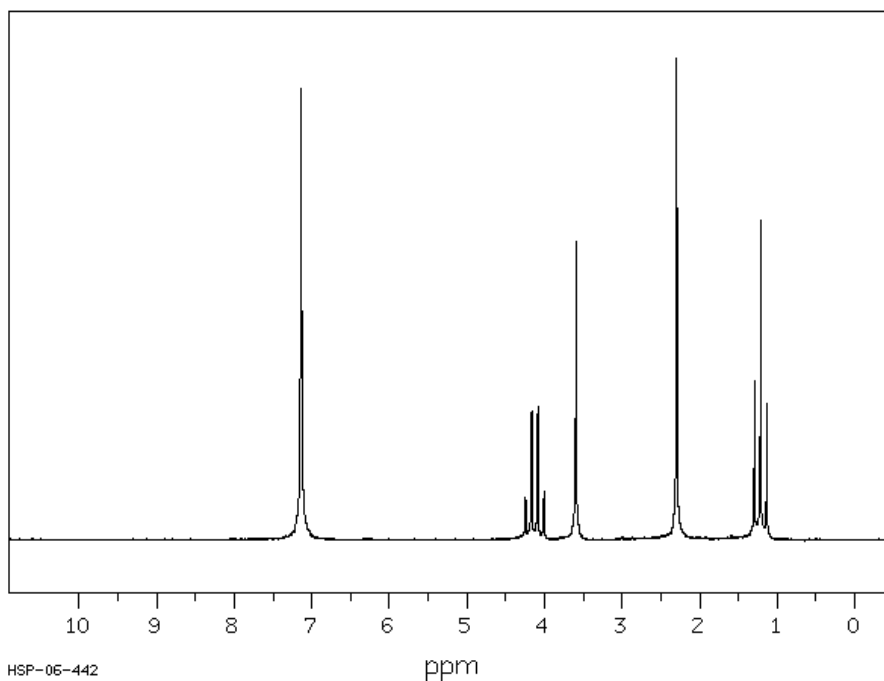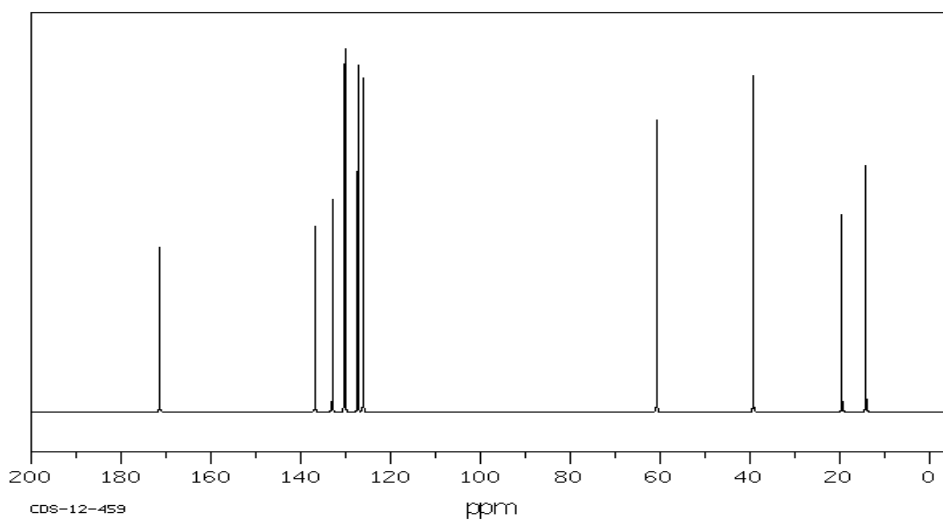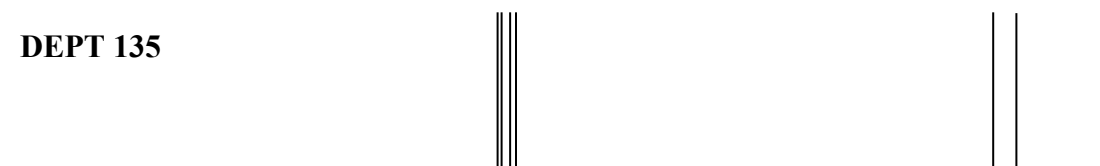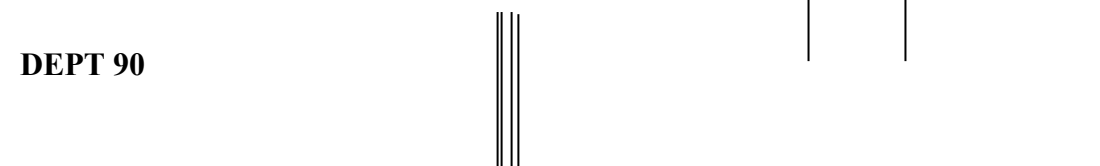**Integration**   2 2   2   3   3

14

CDS-04-906

DEPT 135

DEPT 90

DEPT 45

# of attached hydrogens	0	1	2	3
DEPT 135	0	up	down	up
DEPT 90	0	up	0	0
DEPT 45	0	up	up	up

Final Answer

15

8. Compound **W** has an empirical formula of $C_{11}H_{14}O_2$. Given are the following spectra. **Show all your work** (= label peaks in the spectra!)

   a. Determine the degree of unsaturation for the compound.

   b. Assign the five pertinent peaks in the infrared spectrum.

   c. Suggest a structure for compound **W** based on the spectra given. Place your final answer in the box provided below. **Only the molecule placed is this box will receive credit! Partial structures and structures, which do not meet the molecular formula, will not any receive credit.**

HSP-06-442   ppm

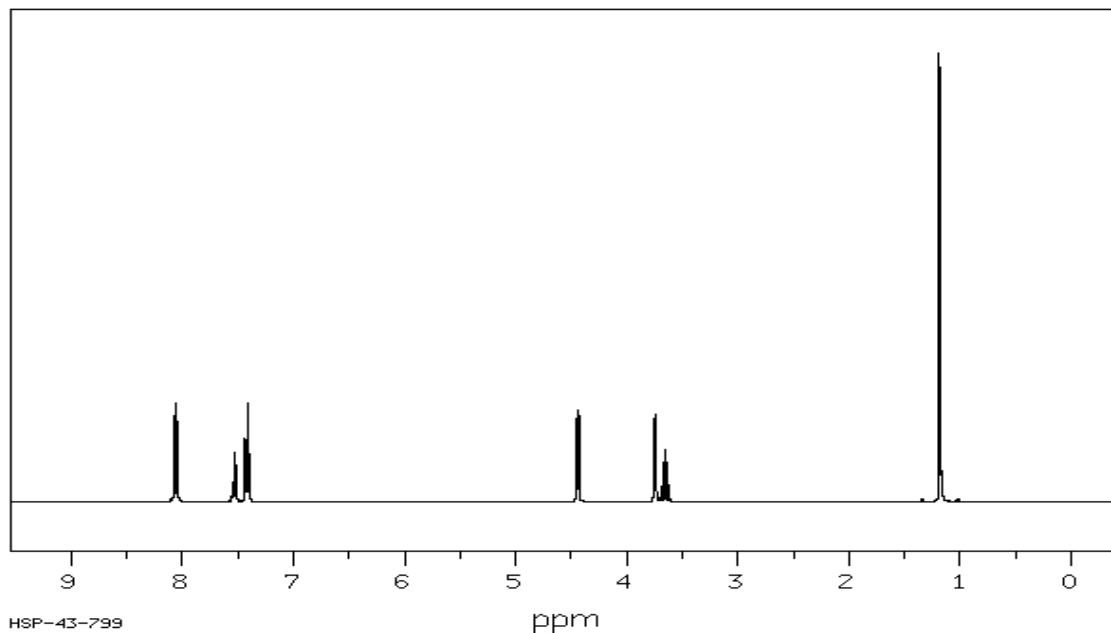| **Integration** | | 4 | | | 2 | 2 | | 3 | 3 |
| **Multiplet** | | d/d/t/t | | | | | | | |

16

CDS-12-459

DEPT 135

DEPT 90

DEPT 45

# of attached hydrogens	0	1	2	3
DEPT 135	0	up	down	up
DEPT 90	0	up	0	0
DEPT 45	0	up	up	up

Final Answer

17

9. Compound W has an empirical formula of $C_{12}H_{16}O_3$. Given are the following spectra. **Show all your work** (= label peaks in the spectra!)
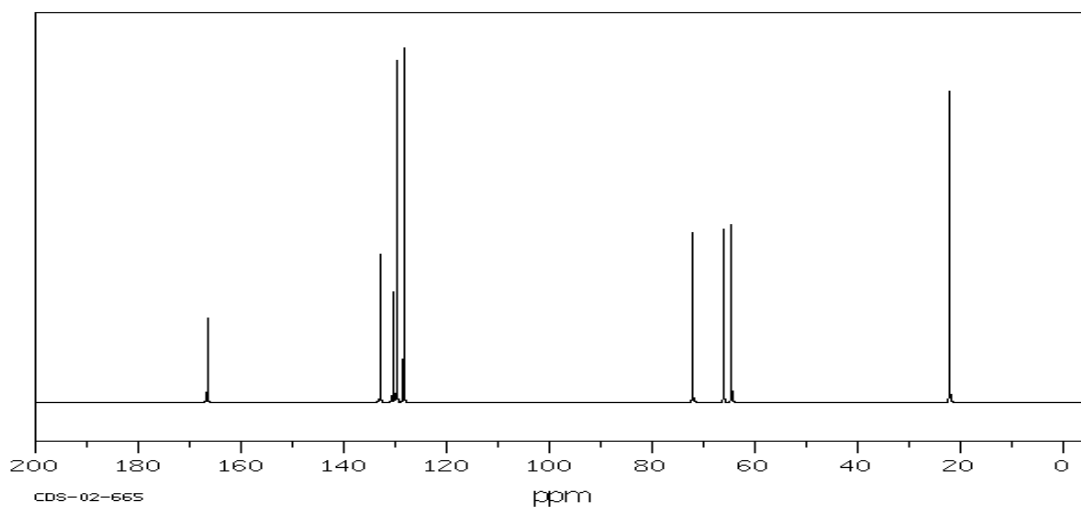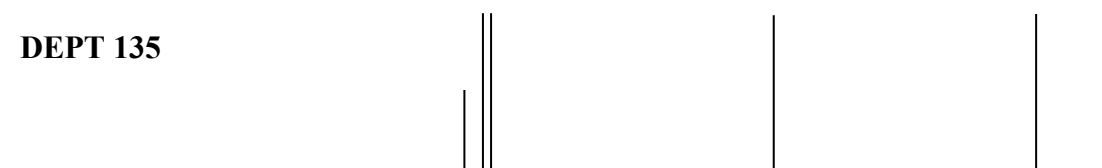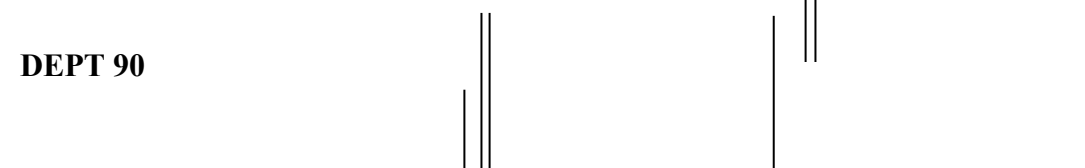
    a. Determine the degree of unsaturation for the compound.

    b. Assign the five pertinent peaks in the infrared spectrum.

    c. Suggest a structure for compound W based on the spectra given. Place your final answer in the box provided below. **Only the molecule placed is this box will receive credit! Partial structures and structures, which do not meet the molecular formula, will not any receive credit.**

HSP-43-799
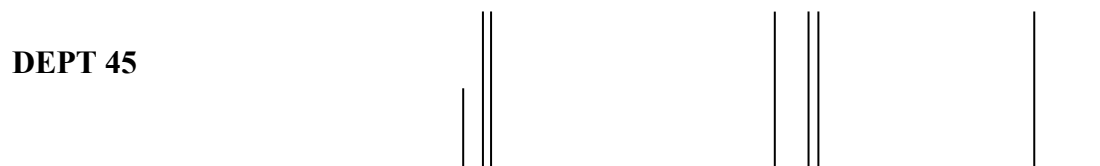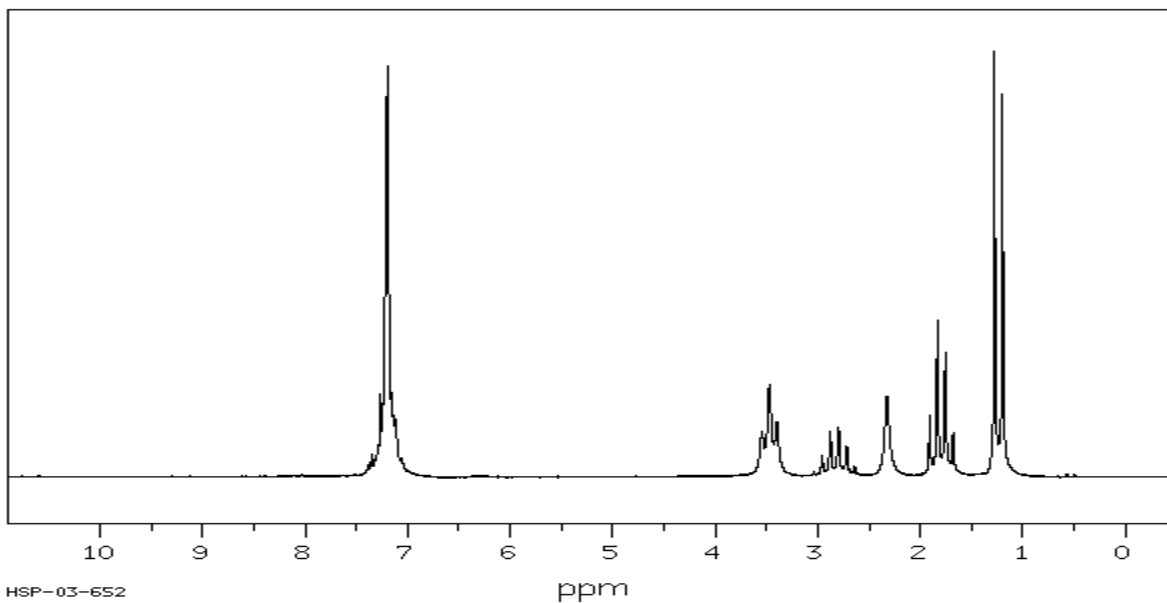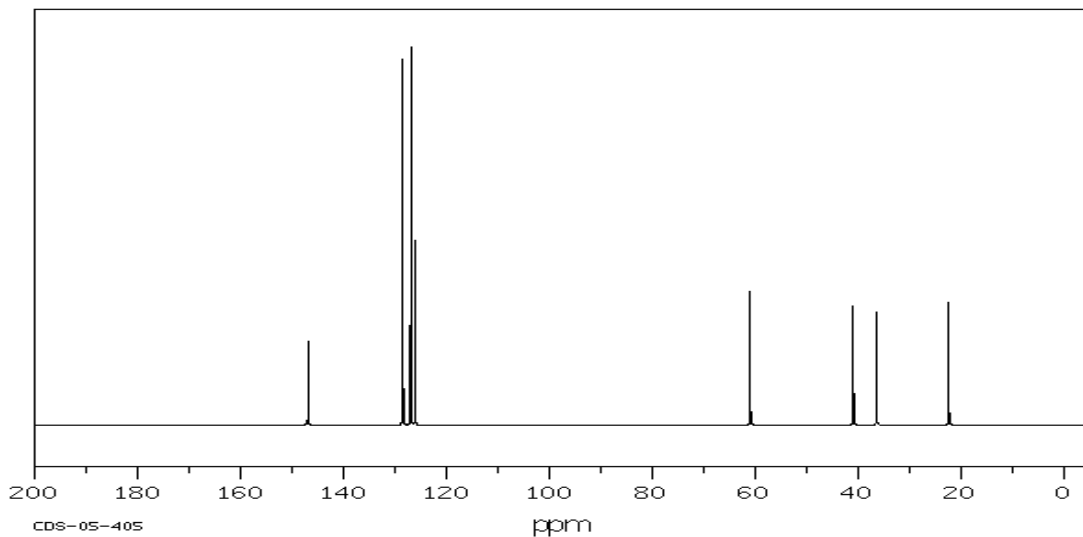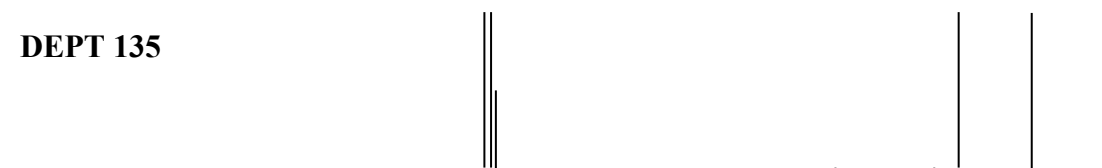
Integration	2	1 2		2	2 1		6
Multiplet	d	t t		t	t m		d

18

CDS-02-665

DEPT 135

DEPT 90

DEPT 45

# of attached hydrogens	0	1	2	3
DEPT 135	0	up	down	up
DEPT 90	0	up	0	0
DEPT 45	0	up	up	up

Final Answer

10. Compound *W* has an empirical formula of $C_{10}H_{14}O$. Given are the following spectra. **Show all your work** (= label peaks in the spectra!)

    a. Determine the degree of unsaturation for the compound.

    b. Assign the five pertinent peaks in the infrared spectrum.

    c. Suggest a structure for compound *W* based on the spectra given. Place your final answer in the box provided below. **Only the molecule placed is this box will receive credit! Partial structures and structures, which do not meet the molecular formula, will not any receive credit.**
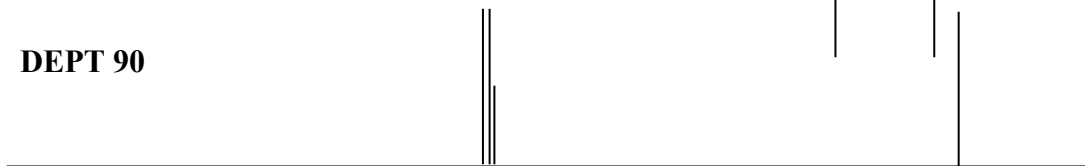

HSP-03-652
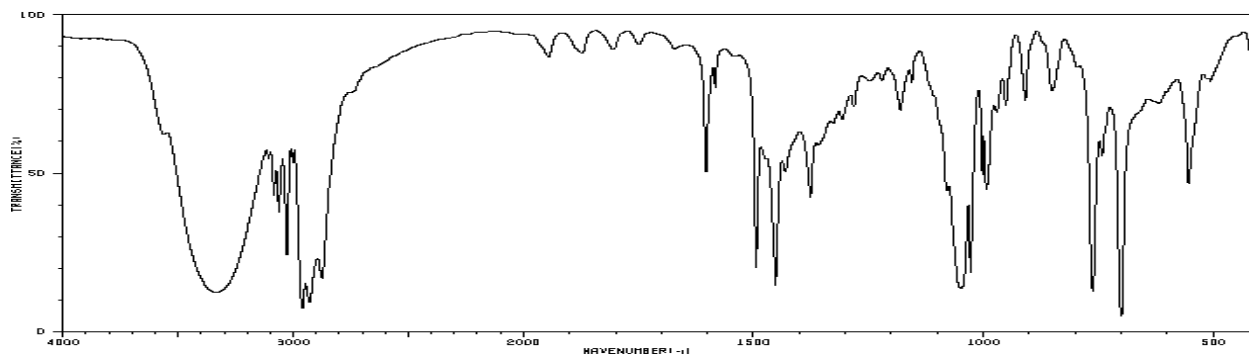
Integration   **5**   **2**   **1** **1** **2** **3**
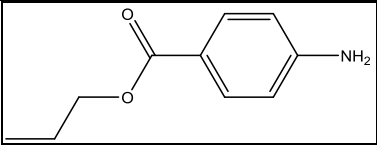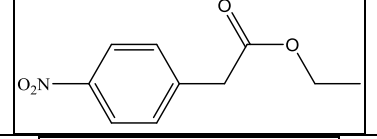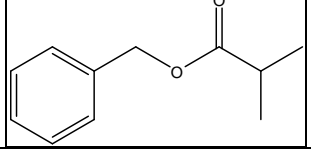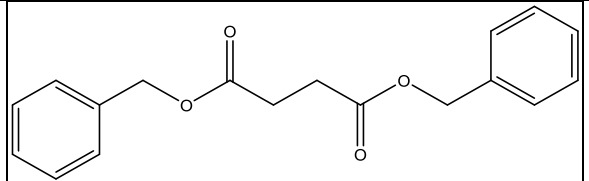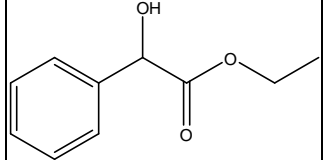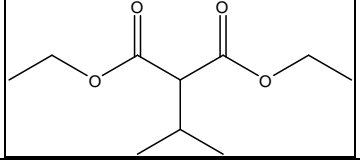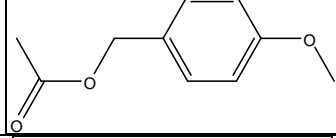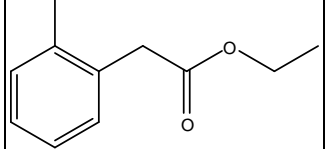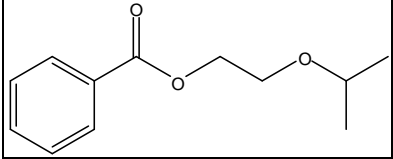
CDS-05-405

DEPT 135
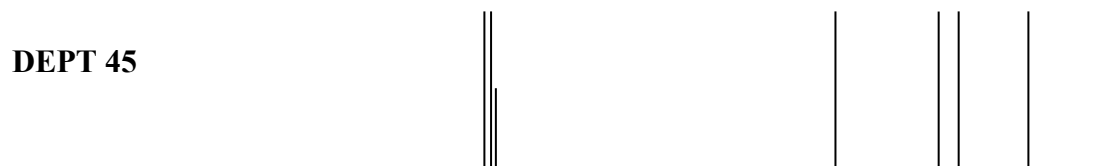
DEPT 90

DEPT 45

# of attached hydrogens	0	1	2	3
DEPT 135	0	up	down	up
DEPT 90	0	up	0	0
DEPT 45	0	up	up	up

Final Answer

Answers

Fall 2007		
Winter 2008		
Spring 2008		
Summer 2008		
Fall 2008		
Winter 2009		
Summer 2009		
Fall 2009		
Winter 2010		
Spring 2010		