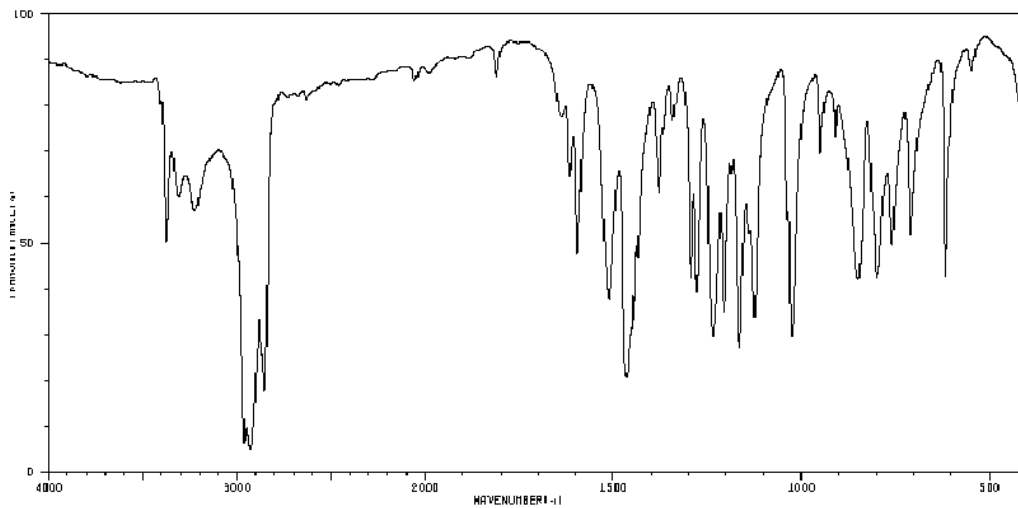


Extra problems for structure determination

Compound 1:  $C_8H_{11}NO_2$

IR: 3310, 3226, 2960, 1639, 1278, 1124



$^1H$  NMR

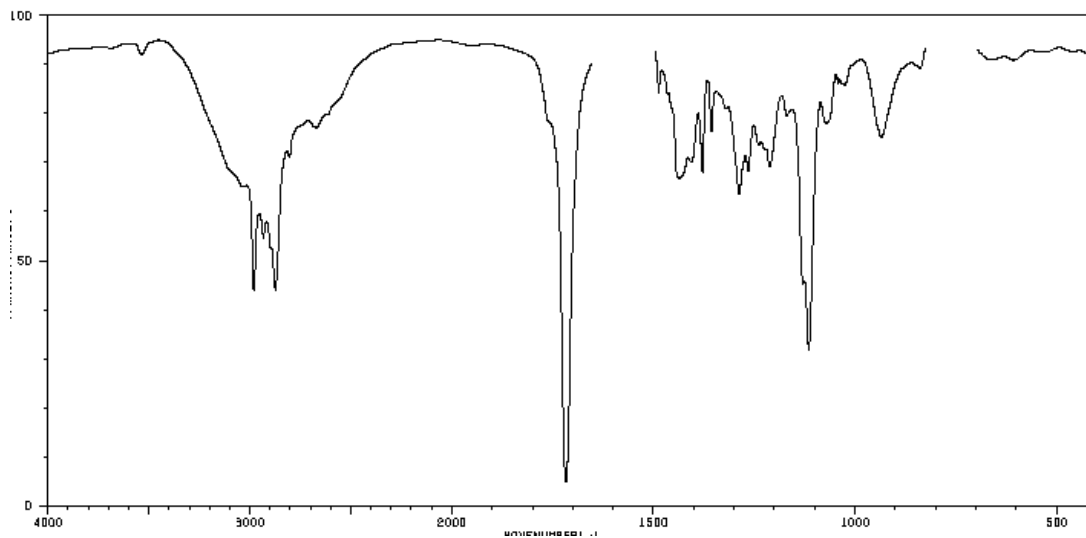
6.9 (d, 1H)  
6.7 (d, 1H)  
6.5 (s, 1H)  
3.8 (s, 3H)  
3.7 (s, 3H)  
3.4 (s, 2H)

$^{13}C$  NMR

150  
142  
141  
113  
106  
100  
57  
56

Compound 2: C<sub>5</sub>H<sub>10</sub>O<sub>3</sub>

IR: 2978, 2933, 1212, 1115 cm<sup>-1</sup>



<sup>1</sup>H NMR

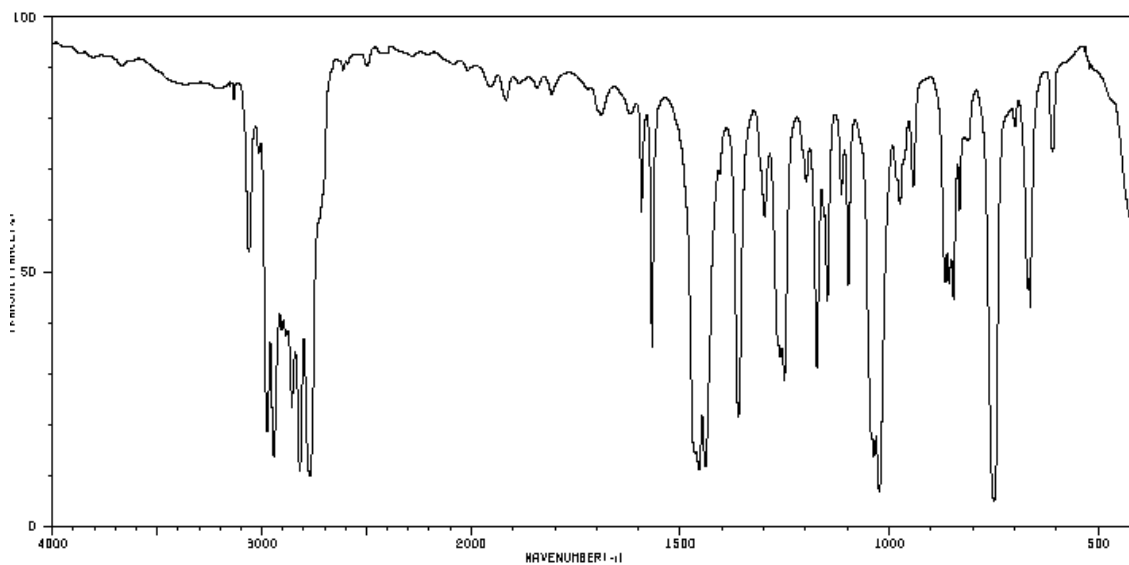
11.2 (s, 1H)  
3.7 (t, 2H)  
3.5 (q, 2H)  
2.6 (t, 2H)  
1.1 (t, 3H)

<sup>13</sup>C NMR

177  
69  
66  
35  
15

Compound 3. C<sub>9</sub>H<sub>12</sub>BrN

IR: 3062, 2975, 1667 cm<sup>-1</sup>



<sup>1</sup>H NMR

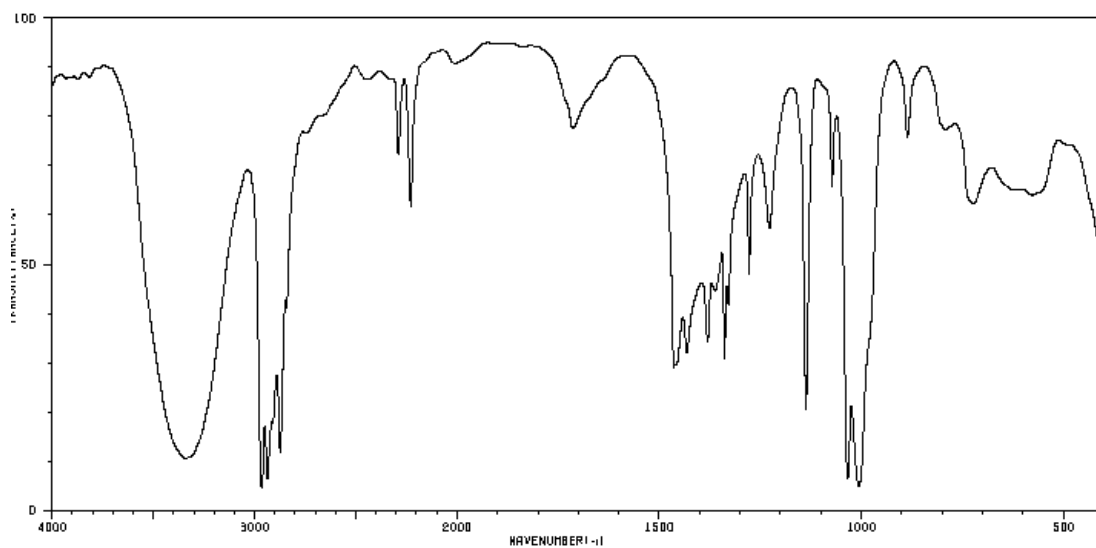
7.5 (d, 1H)  
7.3 (d of d, 1H)  
7.2 (d, 1H)  
7.0 (d of d, 1H)  
3.5 (s, 2H)  
2.3 (s, 6H)

<sup>13</sup>C NMR

138  
133  
131  
129  
127  
124  
63  
45

Compound 4: C<sub>6</sub>H<sub>10</sub>O

IR: 3348, 2964, 1054



<sup>1</sup>H NMR

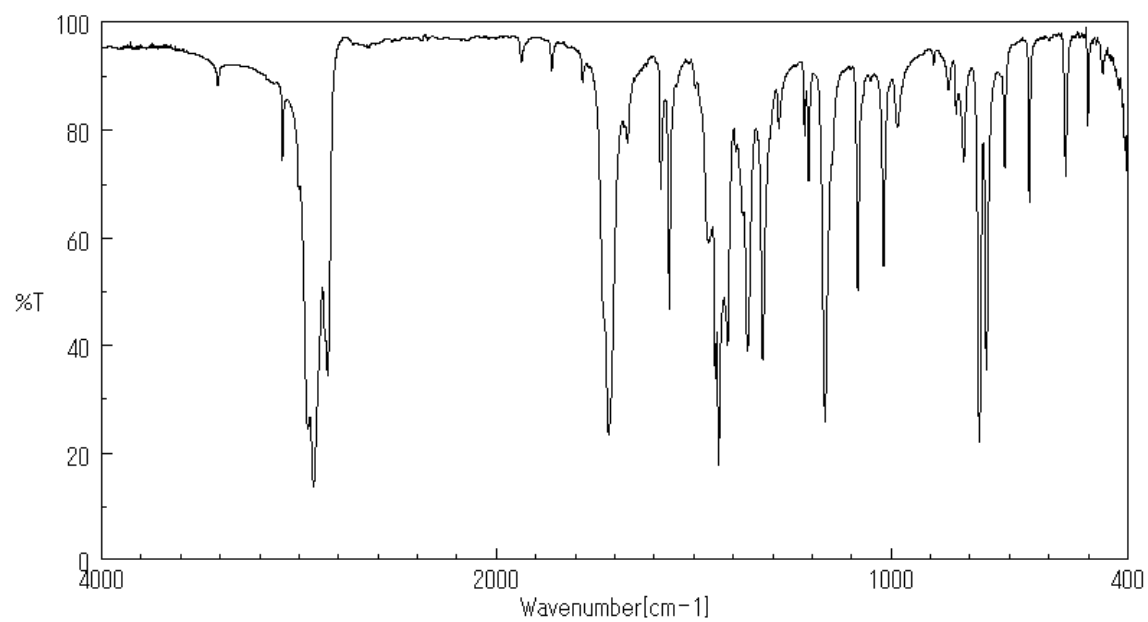
4.2 (s, 2H)  
2.9 (s, 1H)  
2.1 (t, 2H)  
1.5 (t of q, 2H)  
1.0 (t, 3H)

<sup>13</sup>C NMR

86  
79  
50  
22  
20  
13

Problems 5:  $C_{11}H_{11}Cl_3O$

IR 3011, 2984, 1751  $cm^{-1}$



$^1H$  NMR

7.5 (s, 1H)

7.3 (s, 2H)

3.5 (s, 2H)

1.7 (s, 6H)

$^{13}C$  NMR

198

136

135

128

127

71

40

28