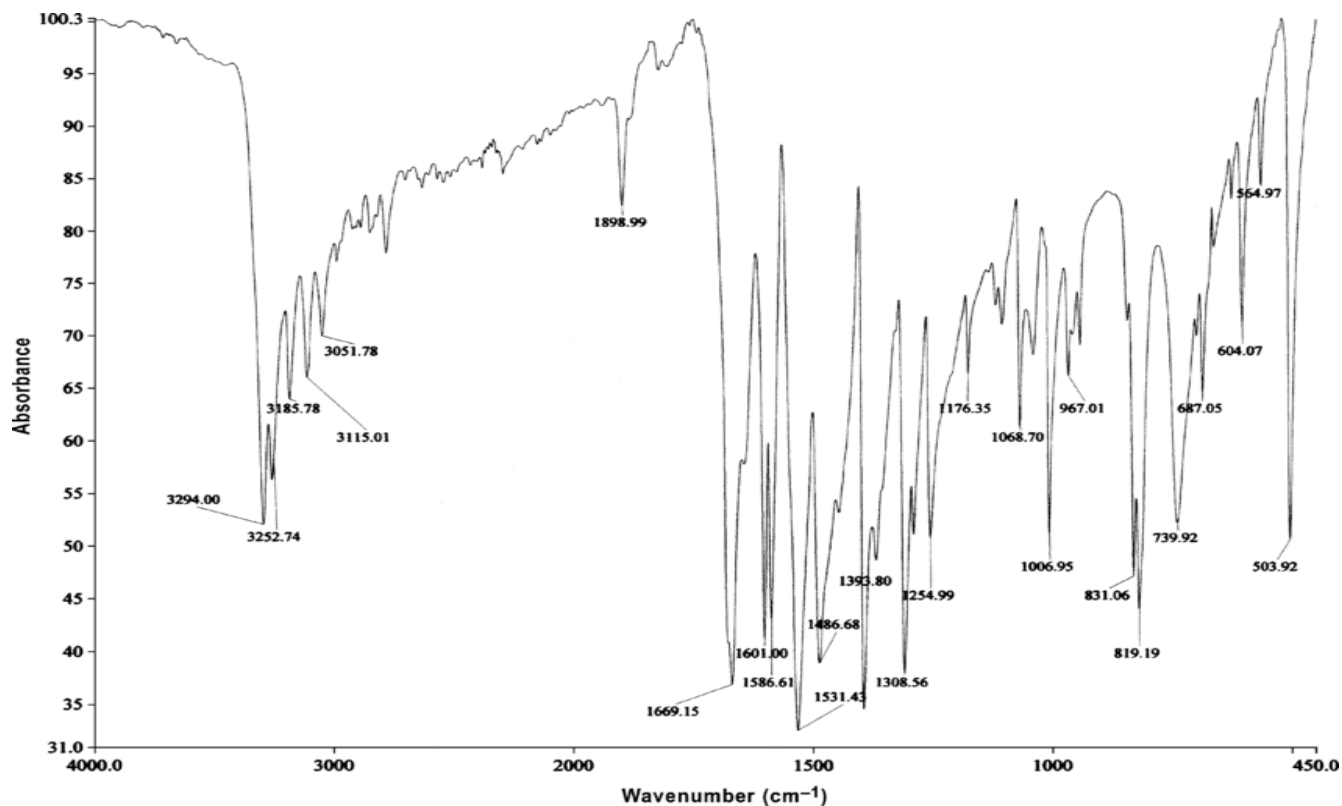


IR Spectrum analysis of *p*-bromoacetanilide:



Spectrum recorded in solution using CCl_4 solvent

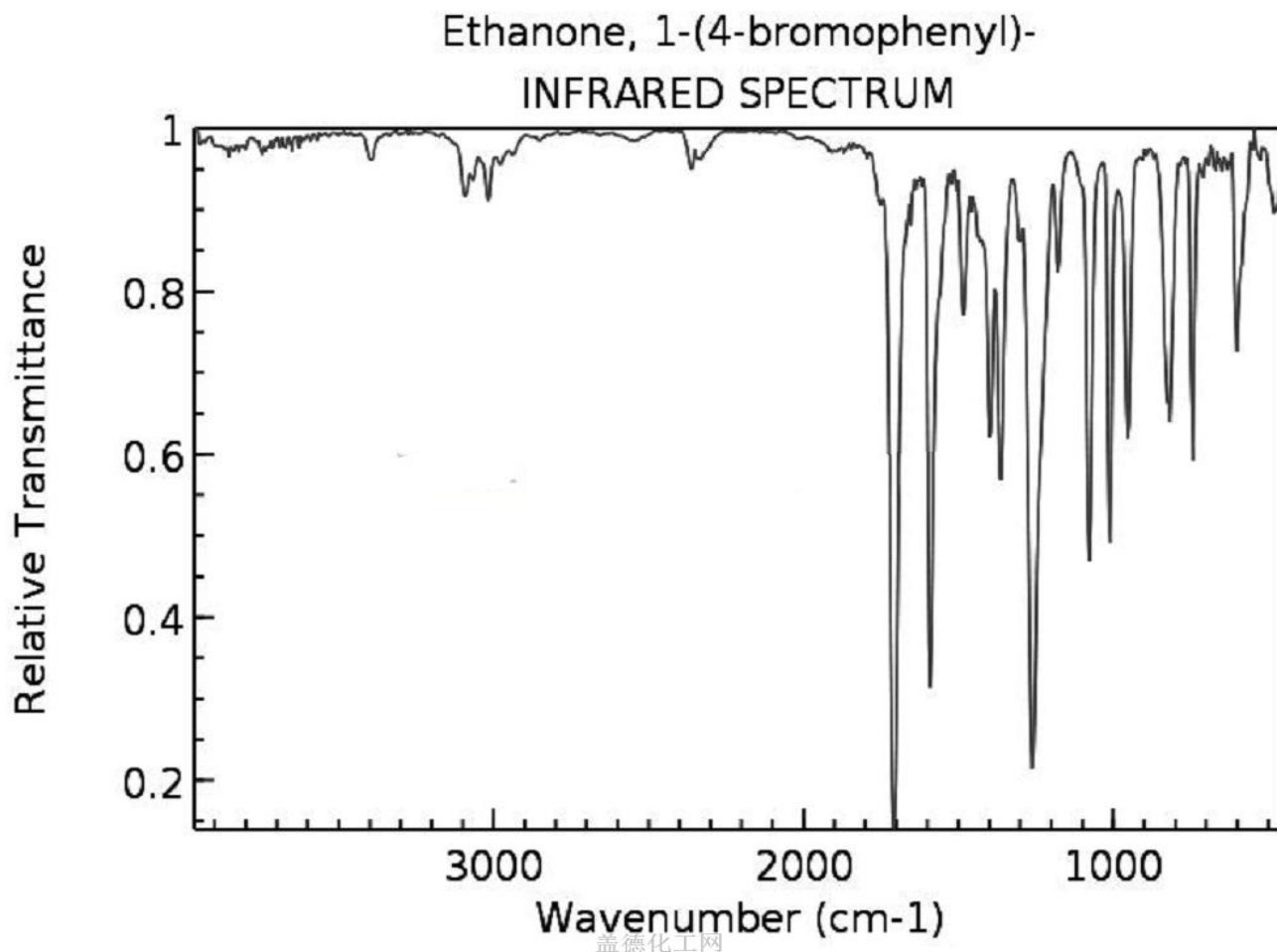
Stretching vibrations (in cm^{-1})	Nature	Probable assignment
3300	m	N–H stretching of amide
2850-2950	s	C–H stretching
1680	s	C=O stretching (amide I)
1600	s	Aromatic C=C stretching
1580	s	Aromatic C=C stretching
1540	s	N–H bending (amide II)
520	w	C–Br stretching

Explanation: 3300 cm^{-1} , medium signal for N–H stretching of secondary amide.

1680 cm^{-1} , broad signal The lowering of C=O stretching frequency is due to the conjugation of non-bonded electron on N of –NH– group with C=O.

1540 cm^{-1} , strong signal for N–H bending (amide II)

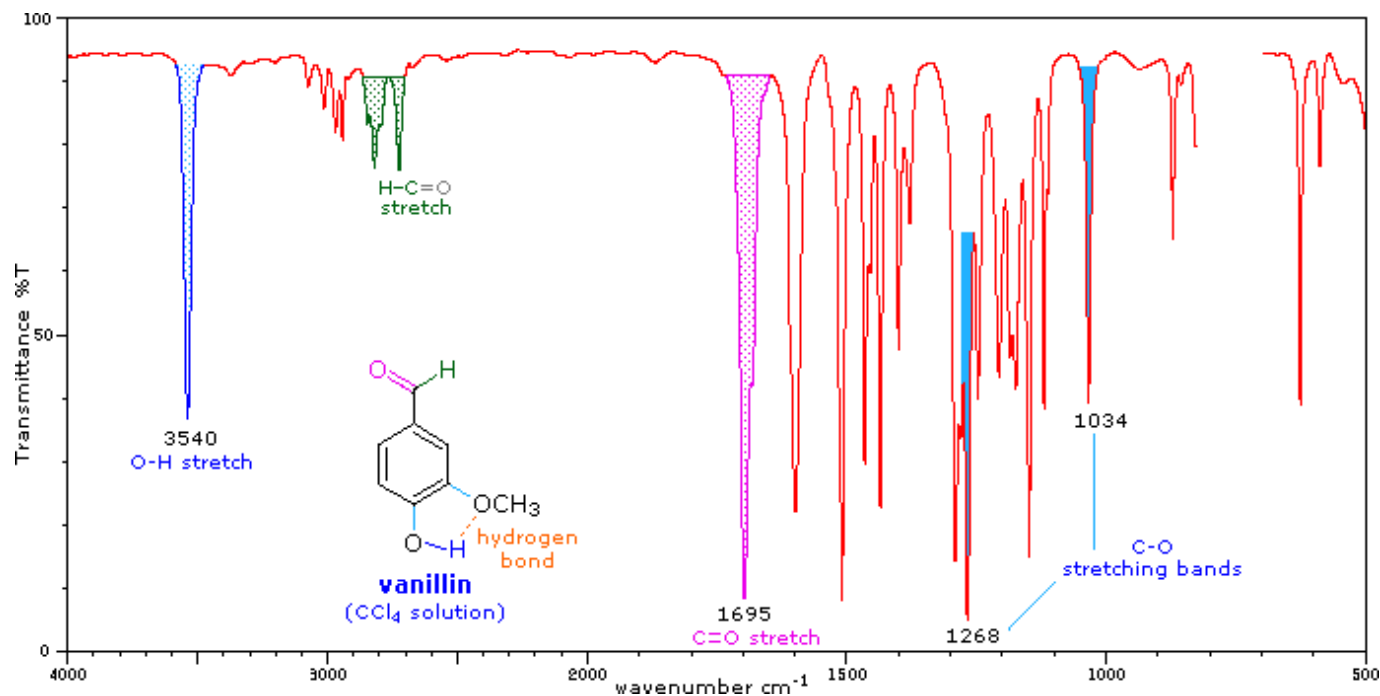
IR Spectrum analysis of 4-methyl- α -bromoacetophenone:



Spectrum recorded in solution using CCl₄ solvent

Stretching vibrations (in cm⁻¹)	Nature	Probable assignment
3050	m	C _{sp2} -H stretching (aromatic)
2975	m	C _{sp3} -H stretching
1710	s	C=O stretching
1600	s	Aromatic C=C stretching
825	s	out of plane C-H bending (p-disubstituted benzene)
550	s	C-Br Stretching

IR Spectrum analysis of *vanillin*:

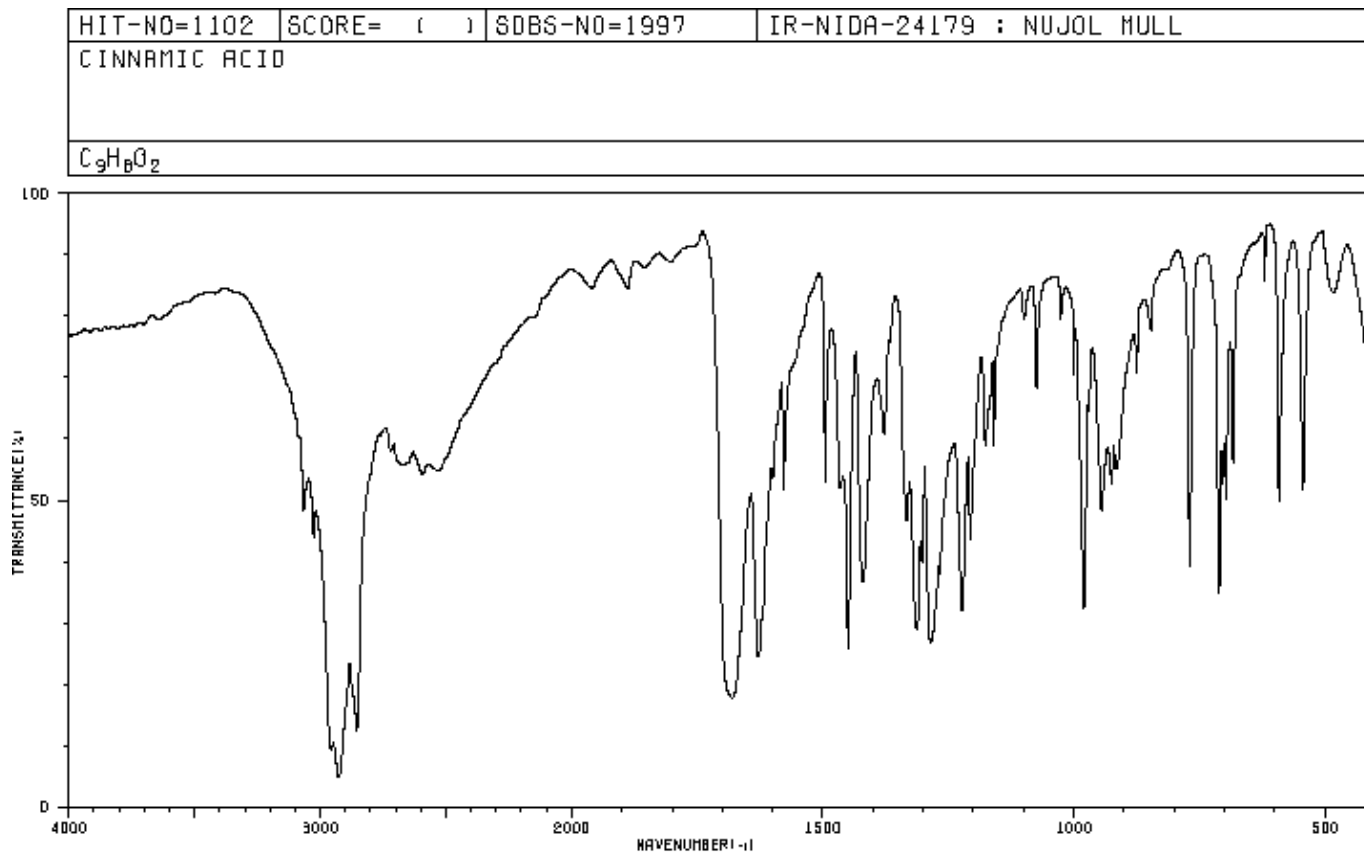


Spectrum recorded in solution using CCl₄ solvent

Stretching vibrations (in cm ⁻¹)	Nature	Probable assignment
3550	s	O-H stretching
3100-2950	w	sp ² C-H and sp ³ C-H stretching (overlapping)
2850 & 2750	m	C-H stretching of -CHO
1700	s	C=O stretching
1600, 1520	s	Aromatic C=C stretching
1150	s	C-O Stretching

Explanation: 2850 & 2700 cm⁻¹, medium signal for C-H stretching, two moderately intense bands are observed. The appearance of two bands is attributed to Fermi resonance between the fundamental aldehydic C-H stretching and the first overtone of the aldehydic C-H bending vibration.

IR Spectrum analysis of *cinnamic acid*:



Spectrum recorded in Nujol Mull

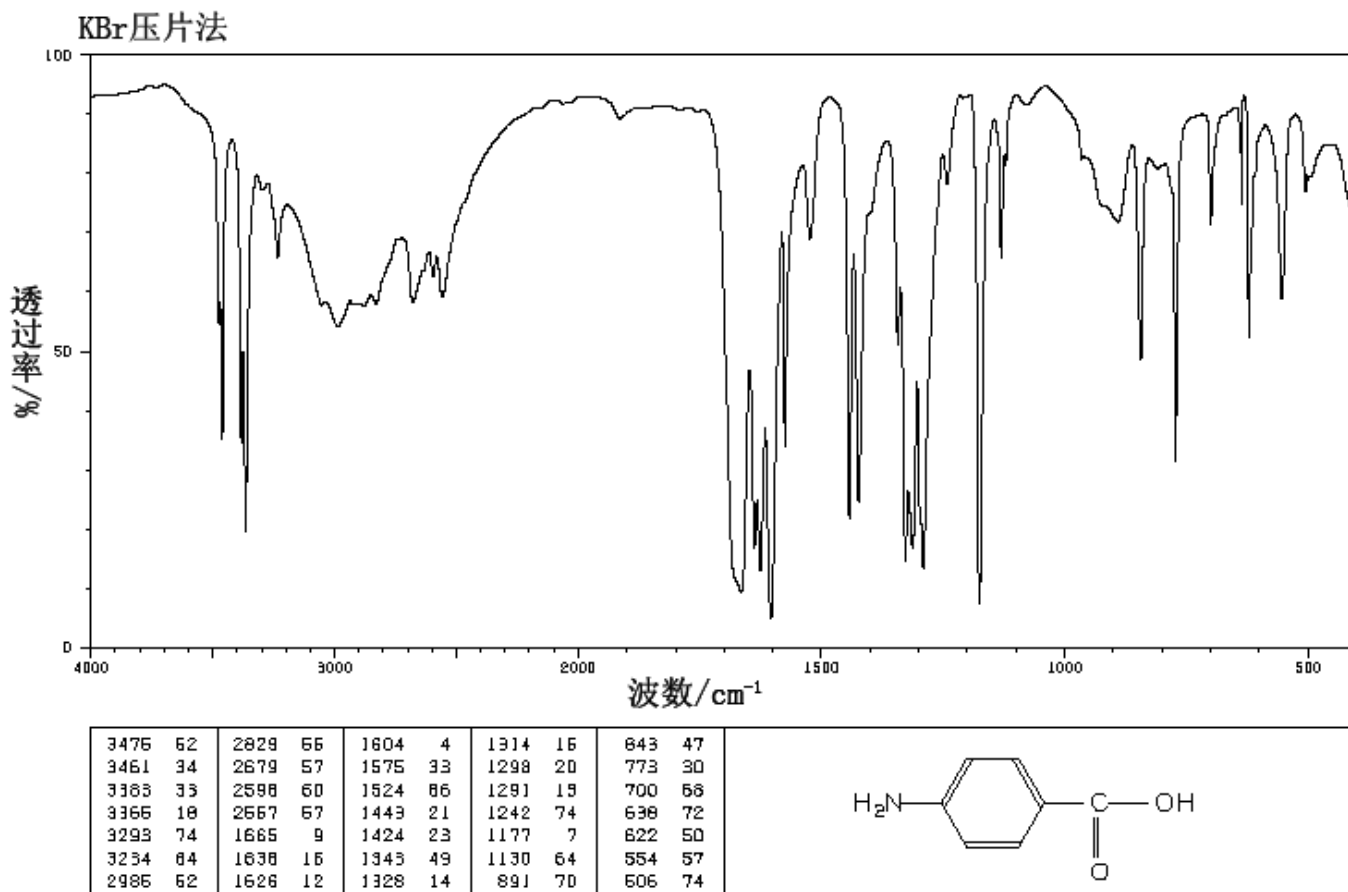
Stretching vibrations (in cm^{-1})	Nature	Probable assignment
2900–2500	br.	O–H stretching
1680	s	C=O stretching
1630	s	Conjugated C=C stretching
1430	s	O–H bending vibration.
970	s	C–H bending (trans alkene)

Explanation: 2900-2500 cm^{-1} , broad signal for O–H stretching. The broad and lowering in frequency is explained by the strong intermolecular H–bonding.

1680 cm^{-1} , strong signal: The lowering of C=O stretching frequency is due to the conjugation of C=C with C=O.

1630 cm^{-1} , strong signal: The lowering of C=C stretching frequency is due to the conjugation of C=C with C=O.

IR Spectrum analysis of 4-aminobenzoic acid:



Spectrum recorded in solution using CCl₄ solvent

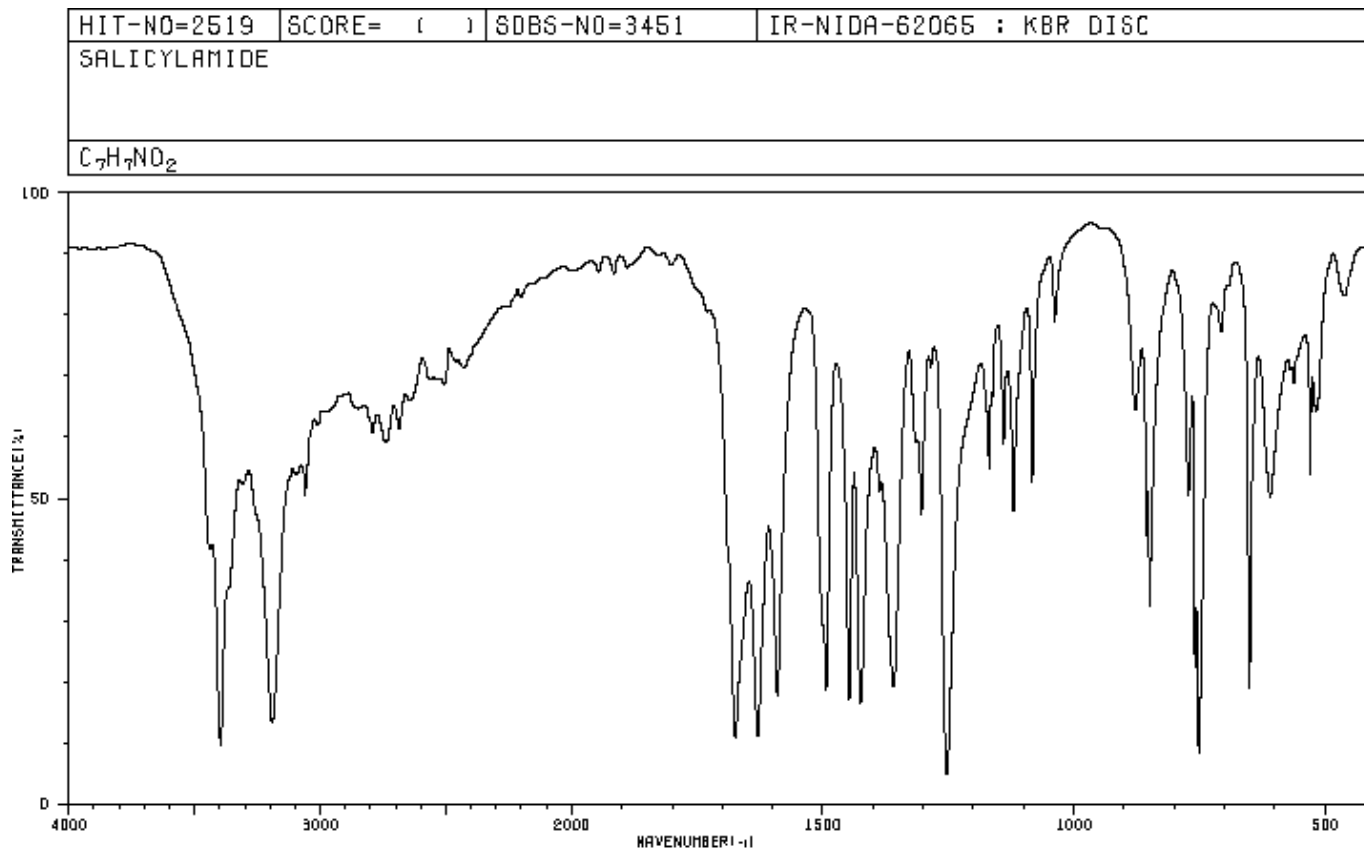
Stretching vibrations (in cm ⁻¹)	Nature	Probable assignment
3460 & 3360	m	N-H stretching
2920	s	C-H stretching
2700–2500	w	Chelate type O-H stretching and carboxylic acid dimers
1670	s	C=O stretching
1650–1600	s	C=C stretching
850	m	Out of plane C-H bending (p-disubstituted benzene)

Explanation: 3460&3360 cm⁻¹, medium signal for N-H stretching. The lowering in frequency is explained by the strong intermolecular H-bonding.

2700–2500 cm⁻¹, weak signal: due to chelate type O-H stretching of carboxylic acid dimer.

1670 cm⁻¹, strong signal: The lowering of C=O stretching frequency is due to the extended conjugation of lone pair of electron of -NH₂ with C=O.

IR Spectrum analysis of *salicylamide*:



3397	9	2640	64	1425	16	1163	64	772	49
3191	13	2506	66	1387	49	1141	57	759	21
3096	52	1674	10	1359	18	1120	46	751	8
3061	49	1630	10	1316	67	1083	60	661	18
2793	58	1591	17	1304	46	878	62	611	49
2739	57	1493	18	1253	4	856	42	530	52
2686	58	1448	17	1169	63	849	31	617	62

Spectrum recorded in KBr disc

Stretching vibrations (in cm^{-1})	Nature	Probable assignment
3400 & 3200	s	N-H stretching (asymmetric & symmetric)
2900	s	C-H stretching
1680	s	C=O stretching (amide I)
1640, 1600	s	N-H bending (amide II)
1580	s	Ar-C=C stretching
1250	s	C-O stretching
750	s	Out of plane C-H bending (o-disubstituted benzene)

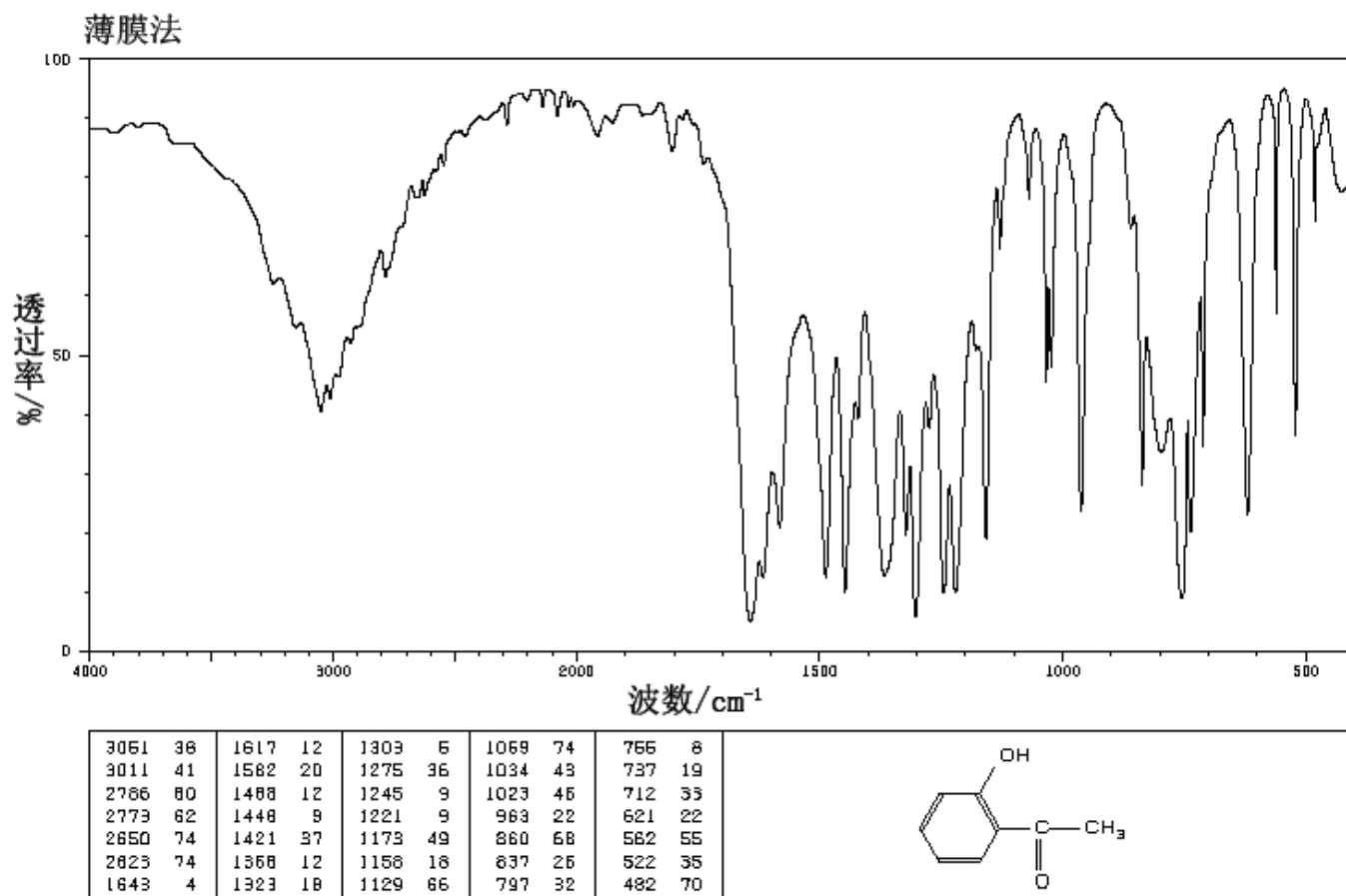
Explanation: 3400 cm^{-1} , strong signal for N-H asymmetric stretching.

3200 cm^{-1} , strong signal for N-H symmetric stretching.

1680 cm^{-1} , strong signal: The lowering of C=O stretching frequency is due to the conjugation of lone pair of electron of $-NH_2$ with C=O. (amide I)

1640, 1600 cm^{-1} , strong signal for N-H bending (amide II)

IR Spectrum analysis of 2-hydroxyacetophenone:



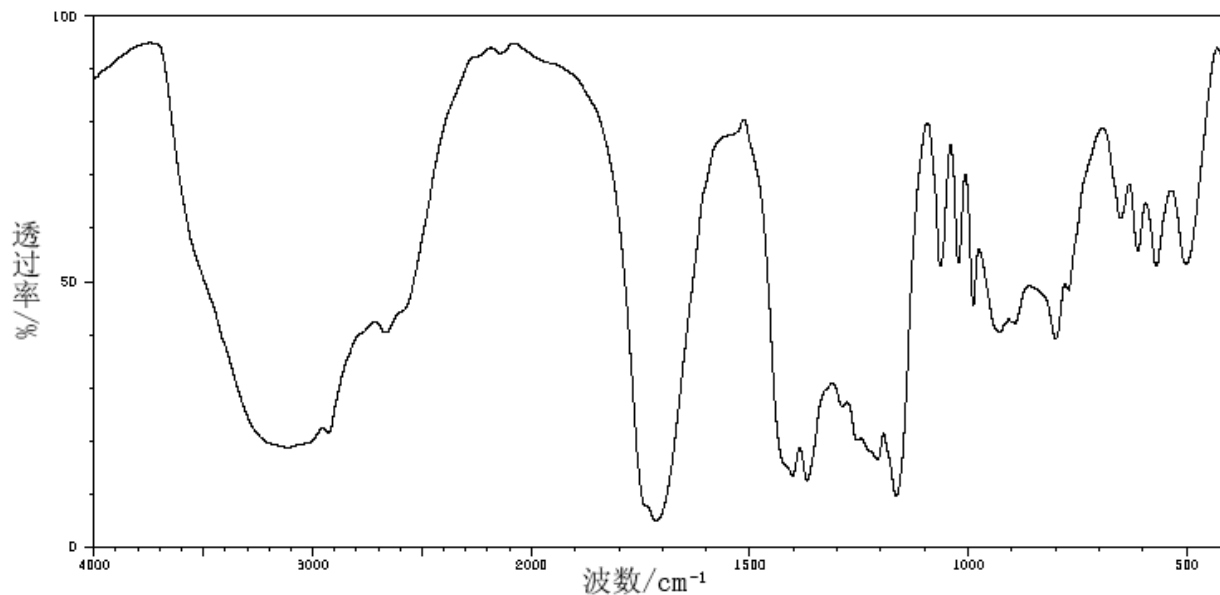
Spectrum recorded in solution using CCl₄ solvent

Stretching vibrations (in cm ⁻¹)	Nature	Probable assignment
3200–2750	br.	O–H stretching
1630	s	C=O stretching
1580–1500	s	Ar–C=C stretching
1260	s	C–O stretching
770	s	Out of plane C–H bending (o-disubstituted benzene)

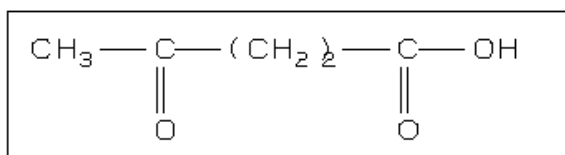
Explanation: 3200–2750 cm⁻¹, broad signal for O–H stretching. Lowering of frequency is due to strong intramolecular H–bonding with carbonyl oxygen.

1630 cm⁻¹, strong signal: The lowering of C=O stretching frequency is due to the conjugation of C=O with aromatic π -electrons and intramolecular H–bonding.

IR Spectrum analysis of 4-ketopentanoic acid:



2666	38	1054	50	612	53
1715	4	1022	52	571	50
1409	13	988	45	505	52
1402	13	930	39	500	52
1369	12	800	37		
1208	16	771	45		
1165	9	661	50		

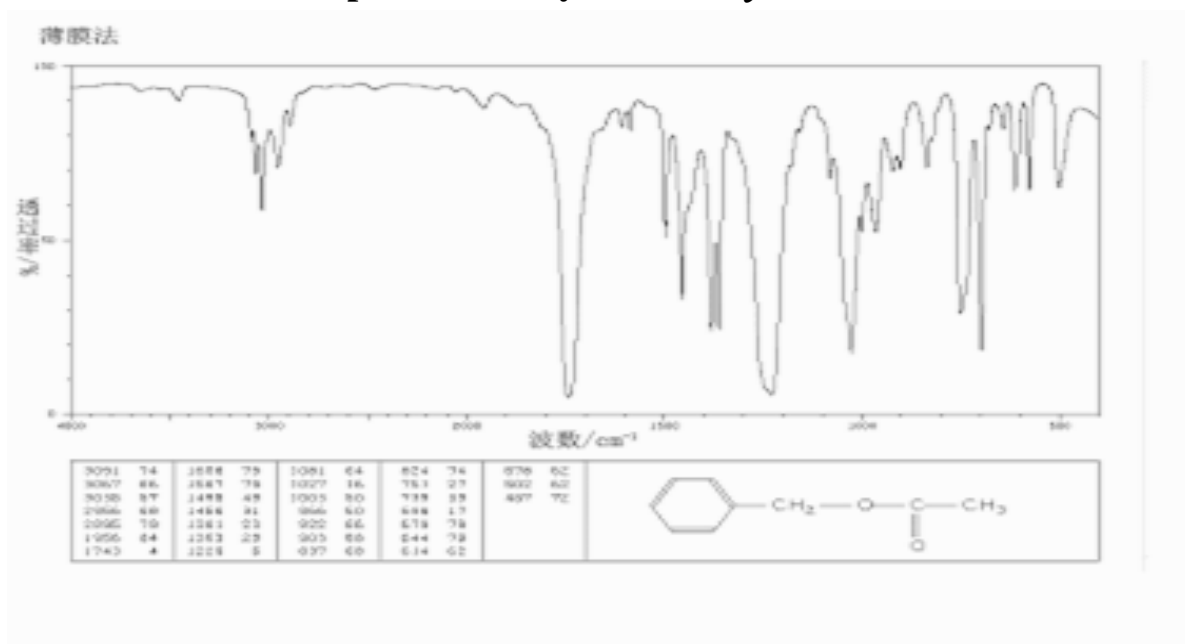


Spectrum recorded in solution using CCl_4 solvent

Stretching vibrations (in cm^{-1})	Nature	Probable assignment
3050–2900	br.	O–H stretching
1750 & 1715	s	C=O stretching
1430 & 1370	s	CH_2 bending

Explanation: 3100 cm^{-1} , broad signal for O–H stretching of $-\text{COOH}$ group. Lowering of frequency is due to strong intramolecular H–bonding with carbonyl oxygen.

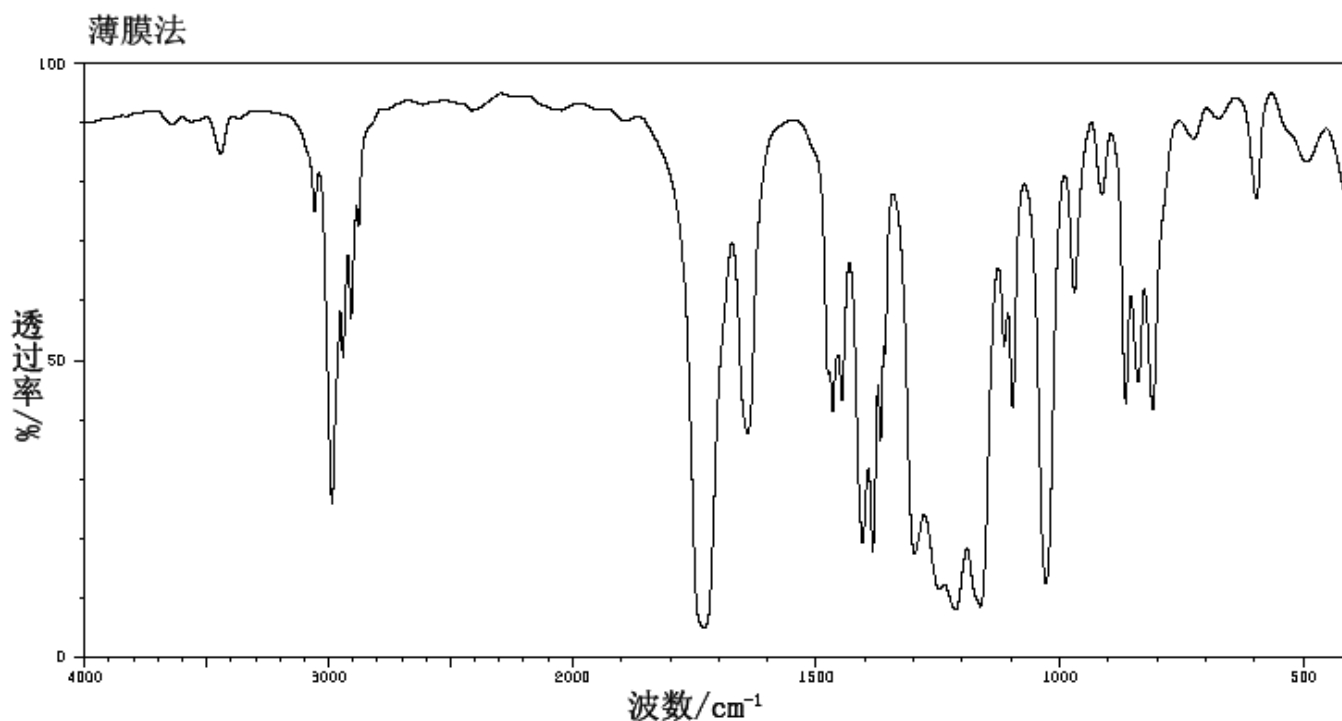
IR Spectrum analysis of *benzyl acetate*:



Spectrum recorded in solution using CCl₄ solvent

Stretching vibrations (in cm ⁻¹)	Nature	Probable assignment
3050	m	Csp ² -H stretching
2950	s	Csp ³ -H stretching
1750	s	C=O stretching
1235	s	C-O stretching
760	s	Out of plane C-H bending (monosubstituted benzene)

IR Spectrum analysis of *diethyl maleate*:
Spectrum recorded in film.



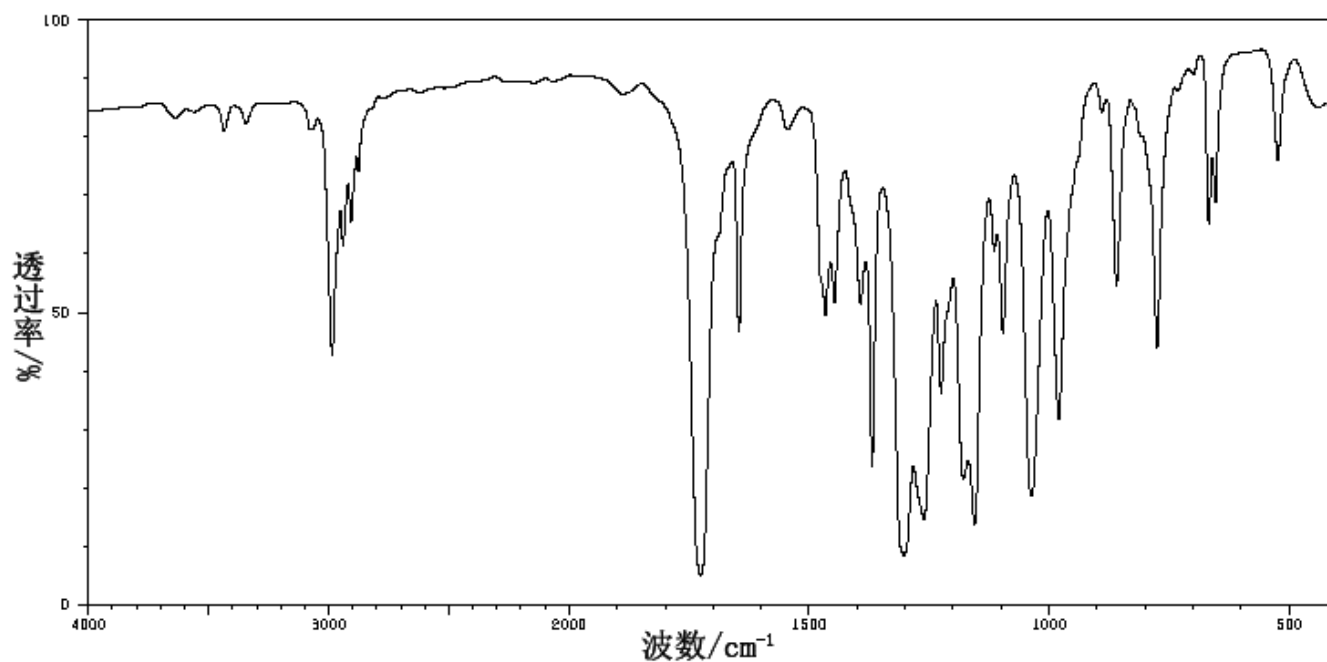
3642	86	1730	4	1368	36	1028	12	596	74	$\begin{array}{c} \text{O} \\ \parallel \\ \text{H}-\text{C}-\text{C}-\text{O}-\text{CH}_2-\text{CH}_3 \\ \\ \text{H}-\text{C}-\text{C}-\text{O}-\text{CH}_2-\text{CH}_3 \\ \parallel \\ \text{O} \end{array}$
3442	81	1641	36	1359	49	970	58	588	81	
3056	72	1478	46	1299	16	913	74	494	79	
2986	24	1466	39	1216	7	866	41			
2942	49	1447	42	1164	8	839	44			
2908	55	1408	18	1114	50	809	39			
2877	70	1384	17	1097	39	726	84			

Stretching vibrations (in cm^{-1})	Nature	Probable assignment
3100–2850	s	C–H stretching
1730	s	C=O stretching
1640	s	C=C stretching
1220	s	C–O stretching

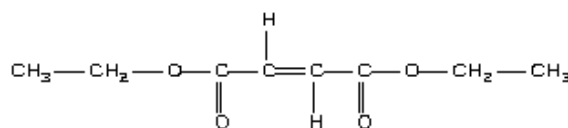
IR Spectrum analysis of *diethyl fumarate*:

Spectrum recorded in film.

薄膜法



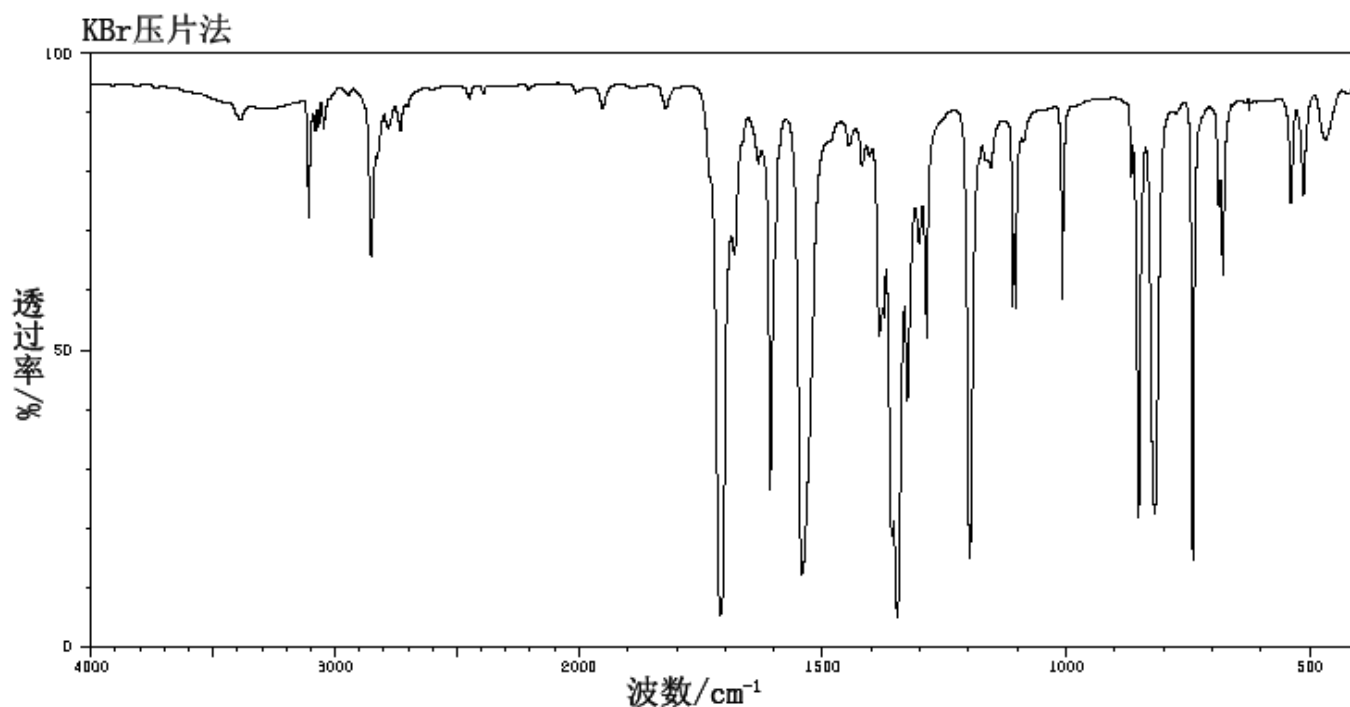
3638	79	2941	68	1646	79	1226	34	980	30
3436	79	2908	62	1467	47	1180	20	890	81
3421	79	2878	72	1447	50	1170	29	860	52
3346	79	1886	84	1393	49	1166	19	776	42
3078	79	1881	84	1369	22	1114	58	867	62
3066	79	1728	4	1303	8	1096	44	654	66
2985	41	1646	44	1261	13	1037	17	624	72



Stretching vibrations (in cm^{-1})	Nature	Probable assignment
2990–2880	s	C–H stretching
1725	s	C=O stretching
1650	m	C=C stretching
985	s	C–H bending, trans alkene

IR Spectrum analysis of 4-nitrobenzaldehyde:

Spectrum recorded in solution using CCl₄ solvent



3107	70	1632	79	1376	63	1163	79	819	21
3080	84	1608	25	1359	17	1155	77	740	13
3046	84	1543	11	1347	4	1110	55	688	72
2862	62	1446	81	1326	39	1104	66	679	60
2827	79	1420	77	1302	66	1008	57	539	72
1710	5	1404	79	1287	50	867	77	514	72
1681	64	1384	60	1199	14	862	20	468	81

Stretching vibrations (in cm ⁻¹)	Nature	Probable assignment
2970–2900	s	C–H stretching
2850 & 2730	m	C–H stretching of –CHO
1710	s	C=O stretching
1540 & 1350	s	N=O stretching of –NO ₂ (asymmetric & symmetric)
820	s	Out of plane C–H bending (p-disubstituted benzene)

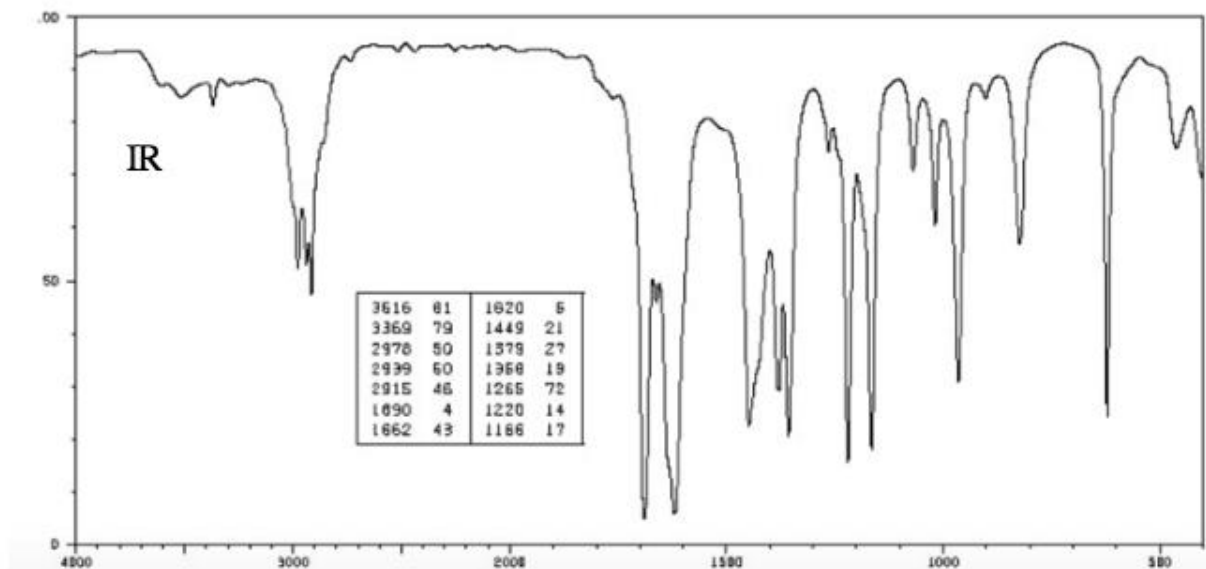
Explanation: 2850 & 2730 cm⁻¹, strong signal for C–H stretching of –CHO group. Two moderately intense bands are observed. The appearance of two bands is attributed to Fermi resonance between the fundamental aldehydic C–H stretching and the first overtone of the aldehydic C–H bending vibration.

1540 cm⁻¹, strong signal due to asymmetric N–O stretching of –NO₂ group.

1350 cm⁻¹, strong signal due to symmetric N–O stretching of –NO₂ group.

IR Spectrum analysis of *mesityl oxide*:

Spectrum recorded in film.



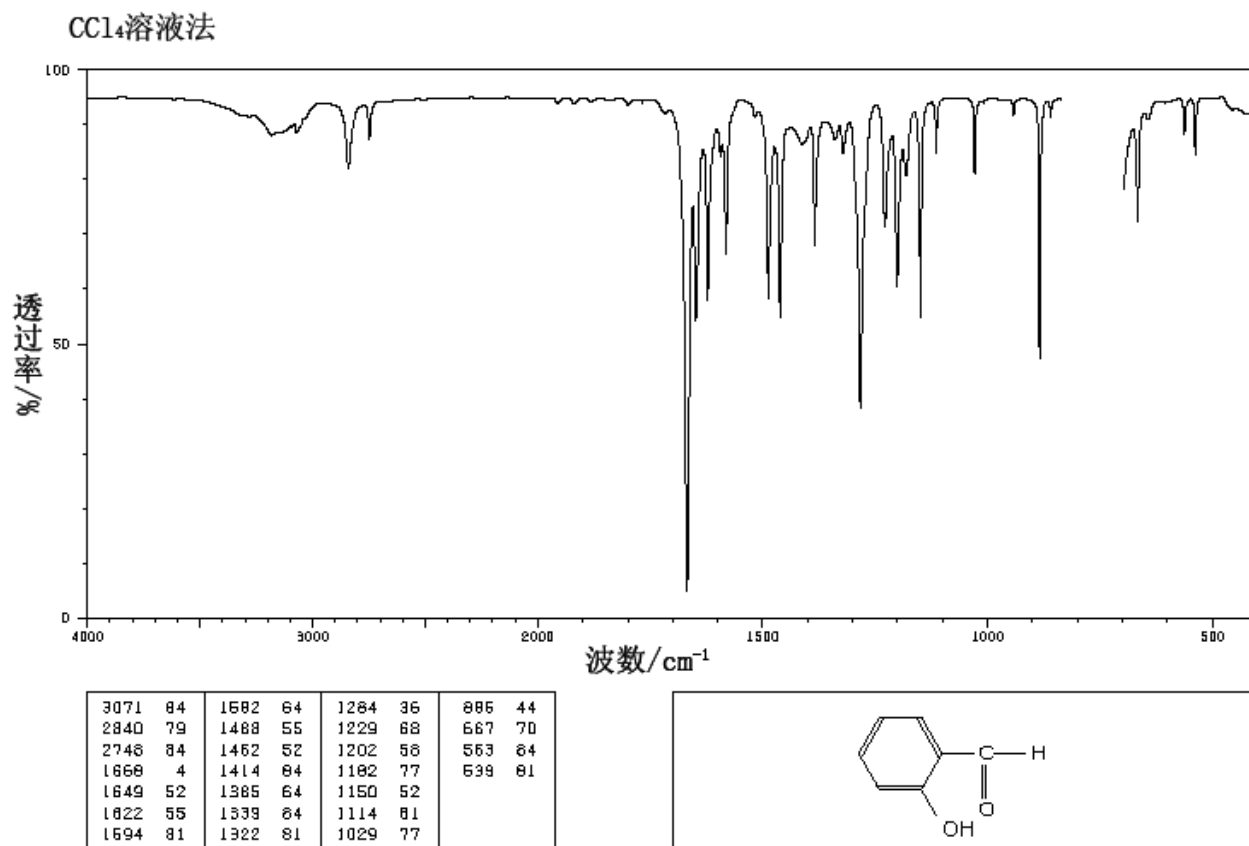
Stretching vibrations (in cm^{-1})	Nature	Probable assignment
2950–2900	s	C–H stretching
1700	s	C=O stretching
1640	s	C=C stretching
1450 & 1360	s	CMe_2

Explanation: 1700 cm^{-1} , strong signal: The lowering of C=O stretching frequency is due to the conjugation of C=C with C=O.

1640 cm^{-1} , strong signal: The lowering of C=C stretching frequency is due to the conjugation of C=C with C=O.

IR Spectrum analysis of *salicylaldehyde*:

Spectrum recorded in CCl_4 .



Stretching vibrations (in cm^{-1})	Nature	Probable assignment
3300–3000	br, shallow	O–H stretching
3060	m	C–H stretching
2850, 2750	m	C–H stretching of –CHO
1670	s	C=O stretching
1490	s	Ar–C=C stretching

Explanation: 3300–3000 cm^{-1} , broad signal for O–H stretching. The strong intramolecular H–bonding occurs in salicylaldehyde, the resulting absorption is at lower frequency and it is broad, shallow, and independent of concentration.

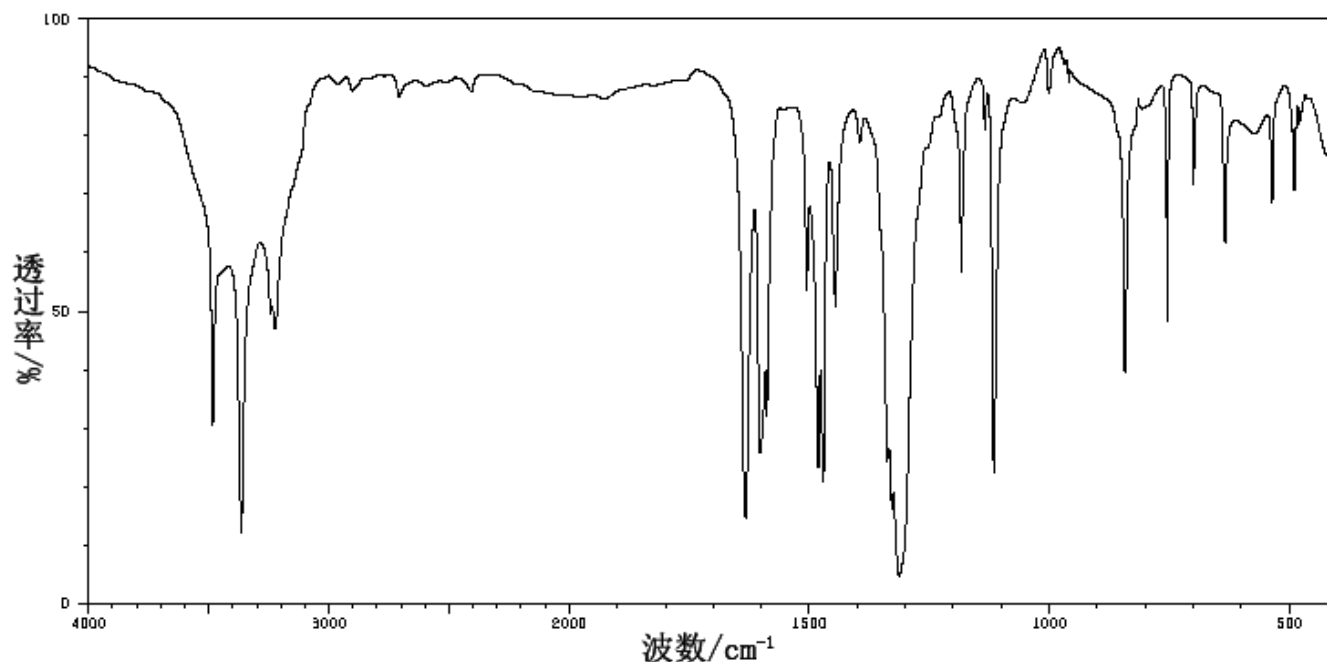
2850 & 2750 cm^{-1} , strong signal for C–H stretching of –CHO group. Two moderately intense bands are observed. The appearance of two bands is attributed to Fermi resonance between the fundamental aldehydic C–H stretching and the first overtone of the aldehydic C–H bending vibration.

1670 cm^{-1} , strong signal: The lowering of C=O stretching frequency is due to the conjugation of C=O with aromatic π -electrons and intramolecular H–bonding.

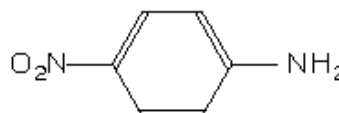
IR Spectrum analysis of *p*-nitroaniline:

Spectrum recorded in KBr

KBr压片法



3484	29	2408	84	1446	49	1116	21	700	68
3365	12	1633	14	1396	77	1001	84	692	84
3244	47	1603	25	1358	23	960	86	634	60
3223	46	1589	31	1329	16	843	38	573	77
2960	86	1505	52	1313	4	800	81	536	66
2901	84	1482	23	1184	55	795	81	490	66
2708	84	1471	20	1134	79	766	47	484	79



Stretching vibrations (in cm^{-1})	Nature	Probable assignment
3480	s	N-H asymmetric stretching
3360	s	N-H symmetric stretching
3200	m	sp^2 Ar-C-H stretching.
1620, 1600		Ar-C=C stretching.
1540 & 1320	s	N=O stretching of NO_2 , (symmetrical and unsymmetrical)
840	s	Out of plane C-H bending (p-disubstituted benzene)

Explanation: 3360 cm^{-1} , strong signal for asymmetric stretching of N-H bond

3200 cm^{-1} , strong signal for symmetric stretching of N-H bond

1540 cm^{-1} , strong signal due to asymmetric N-O stretching of $-\text{NO}_2$ group.

1320 cm^{-1} , strong signal due to symmetric N-O stretching of $-\text{NO}_2$ group.