**FTIR Spectroscopy**

The broad peak at 3440 cm-1 corresponds to the hydroxyl (O-H) stretching due to the presence of alcohol groups and residual moisture. The peaks at 3053 and 2950 cm-1 represent the stretching of the aromatic and alkyl C-H groups respectively. A peak at 1629 cm-1 corresponds to the "amide I" band, which is primarily associated with the stretching vibration of the carbonyl group (C=O). The high intensity peak at 1589 cm-1 corresponds to the stretching of C=C bond in the aromatic ring. A peak at 1450 cm-1 corresponds to the C-N stretching. The peak at 1377 cm-1 corresponds to the C-H stretching vibrations. The peak at 1310 cm-1 corresponds to the O-H bending vibration of alcohol groups and residual moisture. The peaks at 1225 and 1197 cm-1 represents C-O and a peak at 1119 corresponds to C-N stretching vibration. An out of plane N-H bending was observed at 747 cm-1. The absorption peak at 723 cm-1 showed up due to the -CH2 stretching.

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| **Peak Position** | **Group** | **Class** | **Peak Details** |
| 3584-3700 | O-H stretching | alcohol | medium, sharp |
| 3200-3550 | O-H stretching | alcohol | strong, broad |
| 3500 | N-H stretching | primary amine | medium |
| 3300-3400 | N-H stretching | aliphatic primary amine | medium |
| 3310-3350 | N-H stretching | secondary amine | medium |
| 2500-3300 | O-H stretching | carboxylic acid | strong, broad |
| 2700-3200 | O-H stretching | alcohol | weak, broad |
| 2800-3000 | N-H stretching | amine salt | strong, broad |
| 3267-3333 | C-H stretching | alkyne | strong, sharp |
| 3000-3100 | C-H stretching | alkene | medium |
| 2840-3000 | C-H stretching | alkane | medium |
| 2695-2830 | C-H stretching | aldehyde | medium |
| 2550-2600 | S-H stretching | thiol | weak |
| 2349 | O=C=O stretching | carbon dioxide | strong |
| 2250-2275 | N=C=O stretching | isocyanate | strong, broad |
| 2222-2260 | C≡N stretching | nitrile | weak |
| 2190-2260 | C≡C stretching | alkyne | weak |
| 2140-2175 | S-C≡N stretching | thiocyanate | strong |
| 2120-2160 | N=N=N stretching | azide | strong |
| 2150 | C=C=O stretching | ketene |  |
| 2120-2145 | N=C=N stretching | carbodiimide | strong |
| 2100-2140 | C≡C stretching | alkyne | weak |
| 1990-2140 | N=C=S stretching | isothiocyanate | strong |
| 1900-2000 | C=C=C stretching | allene | medium |
| 2000 | C=C=N stretching | ketenimine |  |
| 1650-2000 | C-H bending | aromatic compound | weak |
| 1818 | C=O stretching | anhydride | strong |
| 1785-1815 | C=O stretching | acid halide | strong |
| 1770-1800 | C=O stretching | conjugated acid halide | strong |
| 1775 | C=O stretching | conjugated anhydride | strong |
| 1770-1780 | C=O stretching | vinyl / phenyl ester | strong |
| 1760 | C=O stretching | carboxylic acid | strong |
| 1735-1750 | C=O stretchin | esters | strong |
| 1735-1750 | C=O stretching | δ-lactone | strong |
| 1745 | C=O stretching | cyclopentanone | strong |
| 1720-1740 | C=O stretching | aldehyde | strong |
| 1715-1730 | C=O stretching | α,β-unsaturated ester | strong |
| 1705-1725 | C=O stretching | aliphatic ketone | strong |
| 1706-1720 | C=O stretching | carboxylic acid | strong |
| 1680-1710 | C=O stretching | conjugated acid | strong |
| 1685-1710 | C=O stretching | conjugated aldehyde | strong |
| 1690 | C=O stretching | primary amide | strong |
| 1640-1690 | C=N stretching | imine / oxime | strong |
| 1666-1685 | C=O stretching | conjugated ketone | strong |
| 1680 | C=O stretching | secondary amide | strong |
| 1680 | C=O stretching | tertiary amide | strong |
| 1650 | C=O stretching | δ-lactam | strong |
| 1668-1678 | C=C stretching | alkene | weak |
| 1665-1675 | C=C stretching | alkene | weak |
| 1665-1675 | C=C stretching | alkene | weak |
| 1626-1662 | C=C stretching | alkene | medium |
| 1648-1658 | C=C stretching | alkene | medium |
| 1600-1650 | C=C stretching | conjugated alkene | medium |
| 1580-1650 | N-H bending | amine | medium |
| 1566-1650 | C=C stretching | cyclic alkene | medium |
| 1638-1648 | C=C stretching | alkene | strong |
| 1610-1620 | C=C stretching | α,β-unsaturated ketone | strong |
| 1500-1550 | N-O stretching | nitro compound | strong |
| 1465 | C-H bending | alkane | medium |
| 1450 | C-H bending | alkane | medium |
| 1380-1390 | C-H bending | aldehyde | medium |
| 1380-1385 | C-H bending | alkane | medium |
| 1395-1440 | O-H bending | carboxylic acid | medium |
| 1330-1420 | O-H bending | alcohol | medium |
| 1380-1415 | S=O stretching | sulfate | strong |
| 1380-1410 | S=O stretching | sulfonyl chloride | strong |
| 1000-1400 | C-F stretching | fluoro compound | strong |
| 1310-1390 | O-H bending | phenol | medium |
| 1335-1372 | S=O stretching | sulfonate | strong |
| 1335-1370 | S=O stretching | sulfonamide | strong |
| 1342-1350 | S=O stretching | sulfonic acid | strong |
| 1300-1350 | S=O stretching | sulfone | strong |
| 1266-1342 | C-N stretching | aromatic amine | strong |
| 1250-1310 | C-O stretching | aromatic ester | strong |
| 1200-1275 | C-O stretching | alkyl aryl ether | strong |
| 1020-1250 | C-N stretching | amine | medium |
| 1200-1225 | C-O stretching | vinyl ether | strong |
| 1163-1210 | C-O stretching | ester | strong |
| 1124-1205 | C-O stretching | tertiary alcohol | strong |
| 1085-1150 | C-O stretching | aliphatic ether | strong |
| 1087-1124 | C-O stretching | secondary alcohol | strong |
| 1050-1085 | C-O stretching | primary alcohol | strong |
| 1030-1070 | S=O stretching | sulfoxide | strong |
| 1040-1050 | CO-O-CO stretching | anhydride | strong, broad |
| 985-995 | C=C bending | alene | strong |
| 960-980 | C=C bending | alkene | strong |
| 885-895 | C=C bending | alkene | strong |
| 550-850 | C-Cl stretching | halo compound | strong |
| 790-840 | C=C bending | alkene | medium |
| 665-730 | C=C bending | aklene | strong |
| 515-690 | C-Br stretching | halo compound | strong |
| 500-600 | C-I stretching | halo compound | strong |
| 860-900 | C-H bending | 1,2,4-trisubstituted | strong |
| 860-900 | C-H bending | 1,3-disubstituted | strong |
| 790-830 | C-H bending | 1,4-disubstituted | strong |
| 790-830 | C-H bending | 1,2,3,4-tetrasubstituted | strong |
| 760-800 | C-H bending | 1,2,3-trisubstituted | strong |
| 735-775 | C-H bending | 1,2-disubstituted | strong |
| 730-770 | C-H bending | monosubstituted | strong |
| 680-720 |  | benzene derivative |  |