### Bandenlagen wichtiger funktioneller Gruppen (in cm⁻¹)

<table>
<thead>
<tr>
<th>Gesättigt:</th>
<th>CH-Gruppierungen</th>
<th>Ungesättigt:</th>
</tr>
</thead>
<tbody>
<tr>
<td>CH₃:</td>
<td>2960 νₐₛ, 2870 νₛ</td>
<td>=CH₂ 3100 – 3070</td>
</tr>
<tr>
<td>CH₂:</td>
<td>2930 νₐₛ, 2850 νₛ</td>
<td>=CHR 3040 – 3000</td>
</tr>
<tr>
<td>CH:</td>
<td>wenig spezifisch</td>
<td>R-HC=CH₂ 3100 – 3080 und 3040 - 3000</td>
</tr>
</tbody>
</table>

#### C≡C-Gruppierungen
- C=C isoliert 1680 - 1620
- Aryl-C=C ca 1625
- C=C konjugiert 1650 - 1600
- Allene 1965 und 1070

#### C≡C-Gruppierungen
- terminal 2140 - 2100
- Int. 2260 - 2190

<table>
<thead>
<tr>
<th>(subst) Arene</th>
<th>C-H v</th>
<th>ca 3030 mehrere Bnaden</th>
</tr>
</thead>
<tbody>
<tr>
<td>C=C v</td>
<td>1625 – 1575, 1600 – 1560 (w)</td>
<td>1525 – 1475, 1470 - 1440</td>
</tr>
<tr>
<td>C-H def</td>
<td>mono-subst (5 H)</td>
<td>770 - 730</td>
</tr>
<tr>
<td></td>
<td>o-disubst (4H)</td>
<td>770 - 735</td>
</tr>
<tr>
<td></td>
<td>m-di und 1,2,3-trisubst.</td>
<td>810 – 750 und 725 - 680</td>
</tr>
<tr>
<td></td>
<td>p-di, 1,2,4-tri, 1,2,3,4-tetrasubst</td>
<td>860 - 800</td>
</tr>
<tr>
<td></td>
<td>1,3-, 1,2,4-, 1,3,5-, 1,2,3,5-, 1,2,4,5-</td>
<td>900 - 860</td>
</tr>
<tr>
<td></td>
<td>1,3-, 1,2,4-, 1,3,5-, 1,2,3,5-, 1,2,4,5-</td>
<td>900 - 860</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>C=O: Carbonylverbindungen</th>
</tr>
</thead>
<tbody>
<tr>
<td>1756 – 1722 Ges. Ester</td>
</tr>
<tr>
<td>1724 - 1718 C=COOR, Ar-COOR</td>
</tr>
<tr>
<td>1776 Vinylester</td>
</tr>
<tr>
<td>1800 - 1740 5-Ring-Lactone</td>
</tr>
<tr>
<td>1818 4-Ring-Lactone</td>
</tr>
<tr>
<td>1720 – 1706</td>
</tr>
<tr>
<td>1685 – 1665</td>
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<tr>
<td>1700 – 1680</td>
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<tr>
<td>1775</td>
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<tr>
<td>1740</td>
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<tr>
<td>1740 - 1720</td>
</tr>
<tr>
<td>1705 – 1685</td>
</tr>
<tr>
<td>1710 – 1695</td>
</tr>
</tbody>
</table>

**Carbonsäuren**

| 3550        | O-H v monomer                   |
| 3000 - 2500 | O-H v dimer, sehr breit         |
| 1725 - 1705 | C=O dimer                       |
| 1710 - 1680 | C=O konjugiert                  |

**Carbonsäurehalogenide und Anhydride**

| 1815 – 1770 | C=O v bei COHal                 |
| 1850 – 1800 und 1790 – 1740 | C=O v Ges. offenkett Anhydride |
| 1870 – 1820 und 1800 – 1750 | C=O v Ges. 5-Ring- Anhydride    |

**O-H-Gruppe:**

| 3700 - 3500 | O-H v unverbrückt               |
| 3450 - 3200 | O-H v verbrückt                 |

| 1200        | C-OH v Phenole                  |
| 1150        | C-OH v tert Alkohole            |
| 1100        | C-OH v sek. Alkohole            |
| 1050        | C-OH v prim. Alkohole           |

**C-O-C: Äther**

| 1150 - 1060 | aliphatisch                    |
| 1270 - 1230 | Aromatisch-aliphatisch         |

**NO2- Gruppen**

| 1560 - 1500 | 1370 – 1300 asym und sym       |
| 1565 – 1545 und 1383 – 1360 prim und sek | R-NO2 |
| 1545 – 1530 und 1358 – 1342 tert. R-NO2   |
| 1656 – 1610 und 1300 – 1250 R-O-NO2        |

**Nitrile**

| 2260 - 2220 | C≡N Intensität sehr subst.- abhängig |

**Isocyanate**

<p>| 2274 - 2242 | Asym v 1370 (w)                  |
| 2160 - 2120 | Asym v 1350 – 1270 sym           |
| 2350 - 2238 | Aryl-N$_2^+$                     |
| 2173 – 2110 | Diazophenole, -naphthole         |</p>
<table>
<thead>
<tr>
<th>2100 - 2088</th>
<th>Diazoketone</th>
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<tr>
<td>2032 - 2012</td>
<td>Diazoalkane</td>
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<tr>
<td><strong>C=N-Gruppen</strong></td>
<td>Oft schwach und schwer erkennbar</td>
</tr>
<tr>
<td>1690 – 1640</td>
<td>Acyclisch</td>
</tr>
<tr>
<td>1660 – 1630</td>
<td>Konjugiert</td>
</tr>
<tr>
<td>1667</td>
<td>Oxazine, Oxazoline</td>
</tr>
<tr>
<td>1640 – 1633</td>
<td>Imine</td>
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<tr>
<td>1650 – 1635</td>
<td>Azine</td>
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<tr>
<td>1675</td>
<td>Oxime</td>
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<tr>
<td><strong>Amide</strong></td>
<td></td>
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<tr>
<td>3500 und 3400</td>
<td>NH v, Prim. verd. Lsg</td>
</tr>
<tr>
<td>3370 - 3182</td>
<td>mehrere Banden, prim. in konz Lsg, chelat.</td>
</tr>
<tr>
<td>3350 - 3180</td>
<td>Breit, prim im Festkörper</td>
</tr>
<tr>
<td>3460 - 3400</td>
<td>NH v (trans) sek in verd Lsg</td>
</tr>
<tr>
<td>3440 - 3420</td>
<td>NH v (cis) sek in verd Lsg</td>
</tr>
<tr>
<td>3320 – 3270</td>
<td>NH v (trans) sek, flüssig</td>
</tr>
<tr>
<td>3180 - 3140</td>
<td>NH v (cis) sek, flüssig</td>
</tr>
<tr>
<td>3100 - 3070</td>
<td>NH v (cis+trans) sek, flüssig</td>
</tr>
<tr>
<td>3420</td>
<td>NH v, Lactame in verd. Lsg</td>
</tr>
<tr>
<td>3175</td>
<td>Lactame fest, verd. Lsg</td>
</tr>
<tr>
<td>1650</td>
<td>C=O v, Prim, fest/flüss.,„Amid-I“</td>
</tr>
<tr>
<td>1690</td>
<td>Prim, Lsg Amid-I</td>
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<td>1690 - 1630</td>
<td>C=O v, sek, fest/flüss. „Amid-I“</td>
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<td>1700 - 1670</td>
<td>C=O v, sek, Lösung</td>
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<tr>
<td>1670 - 1630</td>
<td>C=O v, tert, fest, Lsg,„Amid-I“</td>
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<td>1750 – 1700</td>
<td>5-Ring-Lactame</td>
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<td>1760 – 1730</td>
<td>β-Lactame</td>
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<tr>
<td>1650 - 1620</td>
<td>Prim. Amide, fest „Amid-II“</td>
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<tr>
<td>1620 – 1590</td>
<td>Prim, verd. Lsg „Amid-II“</td>
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<tr>
<td>1550</td>
<td>Sek, fest „Amid-II“</td>
</tr>
<tr>
<td>1418 – 1399</td>
<td>nur prim (?)</td>
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<tr>
<td>1305 – 1200</td>
<td>Nur sek (?)</td>
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<tr>
<td><strong>Amine</strong></td>
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<tr>
<td>3500 und 3300</td>
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<tr>
<td>1650 – 1590</td>
<td>NH def prim</td>
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<tr>
<td>1650 – 15590</td>
<td>NH def sek</td>
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<tr>
<td>1340 – 1250</td>
<td>C-N v, prim. aromat</td>
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<tr>
<td>1350 - 1280</td>
<td>C-N v, sek. aromat</td>
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<tr>
<td>1360 – 1310</td>
<td>C-N v, tert. aromat</td>
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