



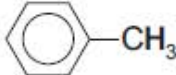
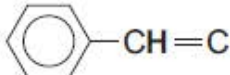
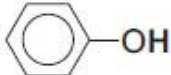
WJEC Eduqas A LEVEL in CHEMISTRY

Data Booklet

Infrared absorption values


Bond	Wavenumber (cm ⁻¹)
C—Br	500 to 600
C—Cl	650 to 800
C—O	1000 to 1300
C=C	1620 to 1670
C=O	1650 to 1750
C≡N	2100 to 2250
C—H	2800 to 3100
O—H (carboxylic acid)	2500 to 3200 (very broad)
O—H (alcohol/ phenol)	3200 to 3550 (broad)
N—H	3300 to 3500

¹H NMR chemical shifts relative to TMS = 0

Type of proton	Chemical shift, δ (ppm)
—CH ₃	0.1 to 2.0
R—CH ₃	0.9
R—CH ₂ —R	1.3
CH ₃ —C≡N	2.0
CH ₃ —C(=O)	2.0 to 2.5
—CH ₂ —C(=O)	2.0 to 3.0
 —CH ₃	2.2 to 2.3
R—CH ₂ Cl	3.3 to 4.3
R—OH	4.5 *
—C=CH—CO	5.8 to 6.5
 —CH=C	6.5 to 7.5
 —OH	7.0 *
R—C(=O)H	9.8 *
R—C(=O)OH	11.0 *

*variable figure dependent on concentration and solvent

¹³C NMR chemical shifts relative to TMS = 0

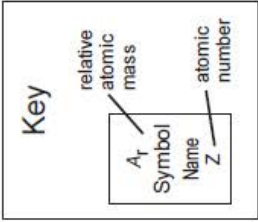
Type of carbon	Chemical shift, δ (ppm)
$\begin{array}{c} \quad \\ -\text{C} - \text{C}- \\ \quad \end{array}$	5 to 40
$\begin{array}{c} \\ \text{R}-\text{C}-\text{Cl} \\ \end{array}$	10 to 70
$\begin{array}{c} \\ \text{R}-\text{C}-\text{C}- \\ \quad \\ \text{O} \end{array}$	20 to 50
$\begin{array}{c} \\ \text{R}-\text{C}-\text{N} \diagup \diagdown \\ \end{array}$	25 to 60
$\begin{array}{c} \\ -\text{C}-\text{O}- \\ \end{array}$	50 to 90
$\begin{array}{c} \diagdown \quad \diagup \\ \text{C} = \text{C} \\ \diagup \quad \diagdown \end{array}$	90 to 150
$\text{R}-\text{C} \equiv \text{N}$	110 to 125
	110 to 160
$\begin{array}{c} \text{R}-\text{C}- \text{(carboxylic acid / ester)} \\ \\ \text{O} \end{array}$	160 to 185
$\begin{array}{c} \text{R}-\text{C}- \text{(aldehyde / ketone)} \\ \\ \text{O} \end{array}$	190 to 220

THE PERIODIC TABLE

Group

1 2 3 4 5 6 7 0

Period

1	1.01 H Hydrogen 1											4.00 He Helium 2			
2	6.94 Li Lithium 3	9.01 Be Beryllium 4											20.2 Ne Neon 10		
3	23.0 Na Sodium 11	24.3 Mg Magnesium 12											35.5 Cl Chlorine 17		
4	39.1 K Potassium 19	40.1 Ca Calcium 20											35.5 Cl Chlorine 17		
5	85.5 Rb Rubidium 37	87.6 Sr Strontium 38											79.9 Br Bromine 35		
6	133 Cs Caesium 55	137 Ba Barium 56											127 I Iodine 53		
7	(223) Fr Francium 87	(226) Ra Radium 88											(222) Rn Radon 86		
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;"> Key  </div>															
s Block			d Block										p Block		
<div style="display: flex; justify-content: space-between;"> ▶ Lanthanoid elements ▶ Actinoid elements </div>															
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f Block															