



# WJEC Eduqas A LEVEL in CHEMISTRY

## Data Booklet

## Infrared absorption values

Bond	Wavenumber (cm <sup>-1</sup> )
C—Br	500 to 600
C—CI	650 to 800
c—o	1000 to 1300
c=c	1620 to 1670
c=0	1650 to 1750
C=N	2100 to 2250
С-Н	2800 to 3100
O—H (carboxylic acid)	2500 to 3200 (very broad)
O-H (alcohol/phenol)	3200 to 3550 (broad)
NH	3300 to 3500

## <sup>1</sup>H NMR chemical shifts relative to TMS=0

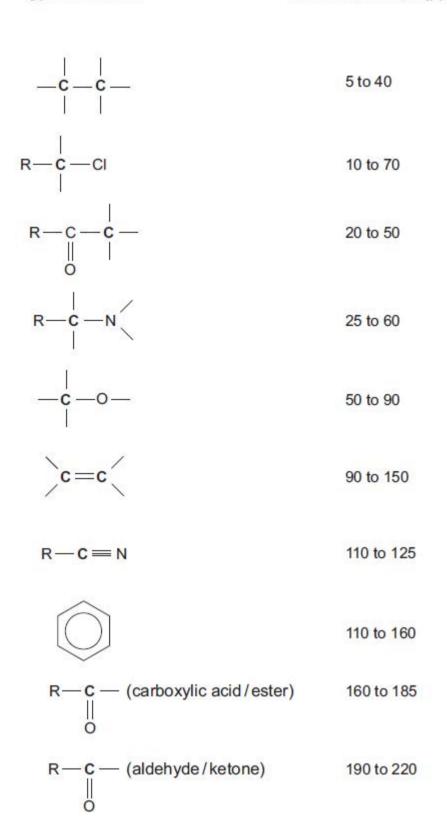
Type of proton	Chemical shift, δ (ppm)
$-CH_3$	0.1 to 2.0
R-CH <sub>3</sub>	0.9
R-CH <sub>2</sub> -R	1.3
CH <sub>3</sub> −C≡N	2.0
CH <sub>3</sub> -C	2.0 to 2.5
-CH2-C	2.0 to 3.0
⟨◯⟩–CH₃	2.2 to 2.3
R-CH <sub>2</sub> CI	3.3 to 4.3
R—OH	4.5 *
-C=CH-CO	5.8 to 6.5
⊘−сн=с	6.5 to 7.5
О н	7.0 *
R-C	9.8 *
R−C <sup>©O</sup> OH	11.0 *

\*variable figure dependent on concentration and solvent

#### <sup>13</sup>C NMR chemical shifts relative to TMS=0

### Type of carbon

#### Chemical shift , δ (ppm)



#### Krypton 36 Xenon Radon 86 4.00 He Helium Argon 18 20.2 Ne Veon 10 (222) Rn 83.8 Kr 0 54 N Chlorine 17 Bromine 35 Fluorine lodine 79.9 Br Astatine 35.5 CI (210) At 19.0 1 127 ~ 6 53 85 Oxygen Tellurium Selenium Sulfur 16 79.0 Se (210) Po Poloniun 16.0 128 Te S.1 S.1 34 52 9 p Block 84 Arsenic 33 Antimony litrogen nosphorus 74.9 As Bismuth 31.0 14.0 N Sb Sb 209 Bi 12 5 2 83 Carbon 6 Silicon 14 Bernanium C 12.0 72.6 Ge Pb B207 B2 82 Tin 50 Si 31 32 4 AI AI 10.8 B 5 Gallium ndium **Thallium** 69.7 Ga 115 In 1 204 13 3 49 3 80 admium 65.4 Zn Zinc 30 lercur 112 Cd Hg 48 THE PERIODIC TABLE 63.5 Cu Copper 29 Ag Silver Au Au Gold 47 f Block alladium Platinum Nickel 28 Pd 58.7 Ni 195 Pt 46 20 58.9 Co 27 27 Rhodium Indium

Rh 103

Ru

98.9 Tc echnetic

95.9 3 woden

92.9 PP N

91.2

88.9

87.6 Sr

85.5 Rb

Z

55.8 Fe ron 26

54.9 Mn

52.0 Cr

50.9

47.9 Ti

45.0 Sc

40.1 Ca

X39.1

Aanganese

Chromium

'anadium

itanium

Scandium

23

22

21

Calcium 20

Potas sium

4

19

25

24

d Block

number

atomic

N

Beryllium

ithium

N

3

9.01 Be

6.94 Li

lydroger

10

24.3 Mg Magnesium

Sodium

=

23.0

Na

3

Symbol Name ۱

Ar

relative

Key

atomic mass uthenium

44

42

4

40

Viobium

Zirconium

Yttrium 39

Strontium 38

Rubidium

5

37

192 Ir 45

190 Os

186 Re 43

¥84

181 Ta

Hf Hf

139 La

137 Ba

133 Cs

Osmium

Rhenium

ungste

antalum

Hafnium

anthanum

Barium

Caesium

6

72

57

29

55

(227) Ac \*\*

(226) Ra

(223) Fr

~

Actinium 89

Radium 88

Francium 87

9

22

<ul> <li>Lanthanoid elements</li> </ul>	Cerium 58	141 Pr Faseotynum 59	144 Naodymium 60	Promerhium 61	150 Sm 62	(153) Eu 63	157 Gd Gadoinum 64	159 Tb Terbium 65	163 Dy Dysprosium 66	165 Ho Holmium 67	167 Er Erbium 68	Tm Thulium 69	173 Yb 70 70	175 Lu Lutetium 71
<ul> <li>Actinoid elements</li> </ul>	Th Thorium 90	(231) Paadinum 91	238 U Uranium 92	(237) Np Neptunium 93	Plutonium 94	(24.3) Am Americium 95	Cm Cm 96	(245) BK Berkelium 97	(251) Cf 98	(254) Es Einsteinium 99	(253) Fm Fermium 100	(256) Md Mendelevium 101	(254) No 102	(257) Lr Lawencum 103

A LEVEL CHEMISTRY Specimen Assessment Materials 68

N

s Block

Period

Group