



A-level
CHEMISTRY

7405

Data Booklet

This Data Booklet is provided with AQA A-level Chemistry question papers.

Data Sheet

Table A

Infrared absorption data

Bond	Wavenumber /cm ⁻¹
N-H (amines)	3300 – 3500
O-H (alcohols)	3230 – 3550
C-H	2850 – 3300
O-H (acids)	2500 – 3000
C≡N	2220 – 2260
C=O	1680 – 1750
C=C	1620 – 1680
C-O	1000 – 1300
C-C	750 – 1100


Table B

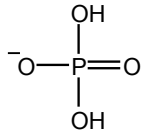
¹H NMR chemical shift data

Type of proton	δ/ppm
ROH	0.5–5.0
RCH ₃	0.7–1.2
RNH ₂	1.0–4.5
R ₂ CH ₂	1.2–1.4
R ₃ CH	1.4–1.6
$\begin{array}{c} \\ \text{R}-\text{C}-\text{C}- \\ \quad \\ \text{O} \quad \text{H} \end{array}$	2.1–2.6
$\begin{array}{c} \\ \text{R}-\text{O}-\text{C}- \\ \\ \text{H} \end{array}$	3.1–3.9
RCH ₂ Cl or Br	3.1–4.2
$\begin{array}{c} \\ \text{R}-\text{C}-\text{O}-\text{C}- \\ \quad \\ \text{O} \quad \text{H} \end{array}$	3.7–4.1
$\begin{array}{c} \text{H} \\ \\ \text{R}-\text{C}=\text{C}- \\ \quad \end{array}$	4.5–6.0
$\begin{array}{c} \text{O} \\ \\ \text{R}-\text{C}-\text{H} \end{array}$	9.0–10.0
$\begin{array}{c} \text{O} \\ \\ \text{R}-\text{C}-\text{O}-\text{H} \end{array}$	10.0–12.0

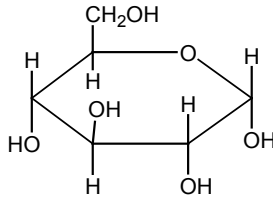
Table C

¹³C NMR chemical shift data

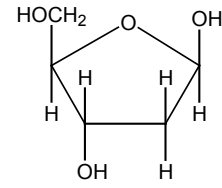
Type of carbon	δ/ppm
$\begin{array}{c} \\ -\text{C}-\text{C}- \\ \end{array}$	5–40
$\begin{array}{c} \\ \text{R}-\text{C}-\text{Cl} \text{ or } \text{Br} \\ \end{array}$	10–70
$\begin{array}{c} \\ \text{R}-\text{C}-\text{C}- \\ \quad \\ \text{O} \end{array}$	20–50
$\begin{array}{c} \quad \\ \text{R}-\text{C}-\text{N} \\ \quad \end{array}$	25–60
$\begin{array}{c} \\ -\text{C}-\text{O}- \\ \end{array}$	50–90 alcohols, ethers or esters
$\begin{array}{c} \diagup \quad \diagdown \\ \text{C}=\text{C} \\ \diagdown \quad \diagup \end{array}$	90–150
R-C≡N	110–125
	110–160
$\begin{array}{c} \text{O} \\ \\ \text{R}-\text{C}- \\ \end{array}$	160–185 esters or acids
$\begin{array}{c} \text{O} \\ \\ \text{R}-\text{C}- \\ \end{array}$	190–220 aldehydes or ketones

Phosphate and sugars

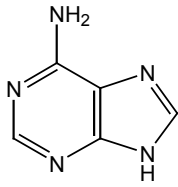
phosphate



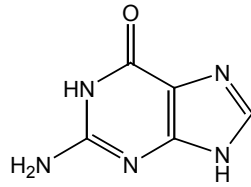
glucose



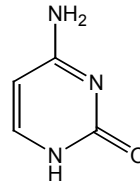
2-deoxyribose

Bases

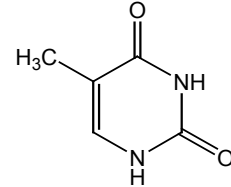
adenine



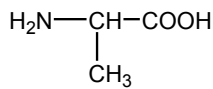
guanine



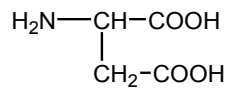
cytosine



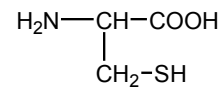
thymine

Amino acids

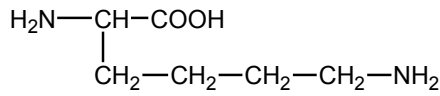
alanine



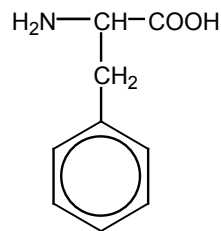
aspartic acid



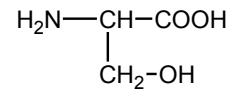
cysteine



lysine



phenylalanine



serine

Haem B