



A-level
CHEMISTRY

7405

Data Booklet

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

The Periodic Table of the Elements

	1	2	3	4	5	6	7	0
(1)	6.9 Li lithium 3	9.0 Be beryllium 4						
(2)	23.0 Na sodium 11	24.3 Mg magnesium 12						4.0 He helium 2
(3)	39.1 K potassium 19	40.1 Ca calcium 20	45.0 Sc scandium 21	47.9 Ti titanium 22	50.9 V vanadium 23	52.0 Cr chromium 24	54.9 Mn manganese 25	55.8 Fe iron 26
(4)	85.5 Rb rubidium 37	87.6 Sr strontium 38	88.9 Y yttrium 39	91.2 Zr zirconium 40	92.9 Nb niobium 41	96.0 Mo molybdenum 42	[98] Tc technetium 43	101.1 Ru ruthenium 44
(5)	132.9 Cs caesium 55	137.3 Ba barium 56	138.9 La * lanthanum 57	178.5 Hf hafnium 72	180.9 Ta tantalum 73	183.8 W tungsten 74	186.2 Re rhenium 75	192.2 Os osmium 76
(6)	[223] Fr francium 87	[226] Ra radium 88	[227] Ac † actinium 89	[267] Rf rutherfordium 104	[268] Db dubnium 105	[271] Sg seaborgium 106	[272] Bh bohrium 107	[270] Hs hassium 108
(7)								
(8)								
(9)								
(10)								
(11)								
(12)								
(13)	10.8 B boron 5	27.0 Al aluminium 13						
(14)	12.0 C carbon 6	28.1 Si silicon 14						
(15)	14.0 N nitrogen 7	31.0 P phosphorus 15						
(16)	16.0 O oxygen 8	32.1 S sulfur 16						
(17)	19.0 F fluorine 9	35.5 Cl chlorine 17						
(18)								


 1.0
H
hydrogen
1

	relative atomic mass	symbol name atomic (proton) number
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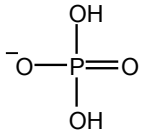
 Elements with atomic numbers 112-116 have been reported but
not fully authenticated

*	58 – 71	Lanthanides	140.1 Ce cerium 58	140.9 Pr praseodymium 59	144.2 Nd neodymium 60	[145] Pm promethium 61	150.4 Sm samarium 62	152.0 Eu europium 63	157.3 Gd gadolinium 64	158.9 Tb terbium 65	162.5 Dy dysprosium 66	164.9 Ho holmium 67	167.3 Er erbium 68	168.9 Tm thulium 69	173.1 Yb ytterbium 70	175.0 Lu lutetium 71
†	90 – 103 Actinides		232.0 Th thorium 90	231.0 Pa protactinium 91	238.0 U uranium 92	[237] Np neptunium 93	[244] Pu plutonium 94	[243] Am americium 95	[247] Cm curium 96	[247] Bk berkelium 97	[251] Cf californium 98	[252] Es einsteinium 99	[257] Fm fermium 100	[258] Md mendelevium 101	[259] No nobelium 102	[262] Lr lawrencium 103

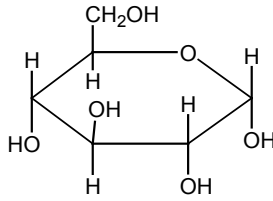
Data Sheet

Infrared absorption data		¹ H NMR chemical shift data		¹³ C NMR chemical shift data	
Bond	Wavenumber /cm ⁻¹	Type of proton	δ/ppm	Type of carbon	δ/ppm
N-H (amines)	3300 – 3500	ROH	0.5–5.0	$\begin{array}{c} \\ -C- \\ \end{array}$	5–40
O-H (alcohols)	3230 – 3550	RCH ₃	0.7–1.2	$\begin{array}{c} \\ R-C- \\ \end{array}$	10–70
C-H	2850 – 3300	RNH ₂	1.0–4.5	$\begin{array}{c} \\ R-C- \\ \\ O \end{array}$	20–50
O-H (acids)	2500 – 3000	R ₂ CH ₂	1.2–1.4	$\begin{array}{c} \\ R-C-N \\ \end{array}$	25–60
C≡N	2220 – 2260	R ₃ CH	1.4–1.6	$\begin{array}{c} \\ -C-O- \\ \end{array}$	50–90
C=O	1680 – 1750	$\begin{array}{c} \\ R-C- \\ \\ O \end{array}$	2.1–2.6	$\begin{array}{c} \diagup \\ C=C \\ \diagdown \end{array}$	90–150
C=C	1620 – 1680	R-O-C-H	3.1–3.9	R-C≡N	110–125
C-O	1000 – 1300	RCH ₂ Cl or Br	3.1–4.2		110–160
C-C	750 – 1100	$\begin{array}{c} \\ R-C-O-C- \\ \\ O \end{array}$	3.7–4.1	$\begin{array}{c} \\ R-C- \\ \\ O \end{array}$	160–185
		$\begin{array}{c} H \\ \\ R-C=C \\ \end{array}$	4.5–6.0	$\begin{array}{c} \\ R-C- \\ \\ O \end{array}$	190–220
		$\begin{array}{c} O \\ \\ R-C-H \end{array}$	9.0–10.0		
		$\begin{array}{c} O \\ \\ R-C-O-H \end{array}$	10.0–12.0		

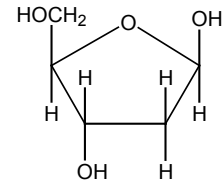
alcohols,
ethers or
estersesters or
acidsaldehydes
or
ketones

Phosphate and sugars

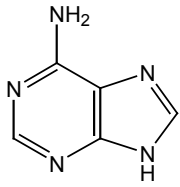
phosphate



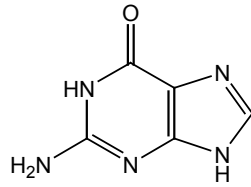
glucose



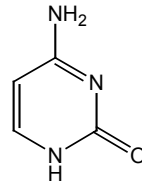
2-deoxyribose

Bases

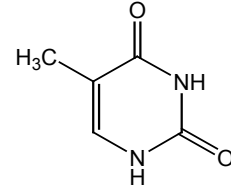
adenine



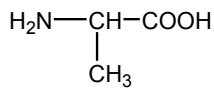
guanine



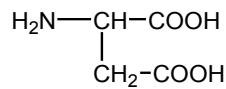
cytosine



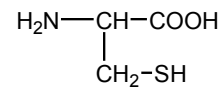
thymine

Amino acids

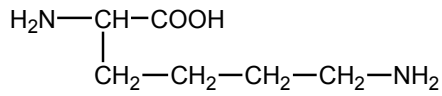
alanine



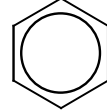
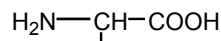
aspartic acid



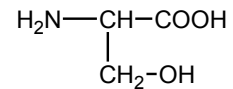
cysteine



lysine



phenylalanine



serine

Haem B