

Pearson Edexcel Level 3 Advanced Subsidiary GCE in Chemistry (8CH0)

Data Booklet

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Centres can make additional fresh copies by printing the Data Booklet from our website. Candidates must use an unmarked copy of the Data Booklet in examinations.

Acknowledgement of source

The data used in the Data Booklet is derived from the *Nuffield Advanced Science*, *Revised Book of Data* (ISBN 058235448X), Nuffield Foundation.

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Introduction

This Data Booklet is for use with the Pearson Edexcel Level 3 Advanced Subsidiary GCE in Chemistry (8CHO) assessments for papers 1 and 2.

Students will be provided with a clean copy of this Data Booklet for these assessments, which should be kept under the same conditions as the assessment papers.

Students may have a copy of this Data Booklet for their personal use in lessons and for homework, to allow them to become familiar with how to use it.

Physical constants

Avogadro constant (L) 6.02 x 10²³ mol⁻¹

Elementary charge (e) $1.60 \times 10^{-19} \text{ C}$

Gas constant (R) 8.31 J mol⁻¹ K⁻¹

Molar volume of a gas at room temperature

and pressure (r.t.p.): 24 dm³ mol⁻¹

 $1 \text{ dm}^3 = 1000 \text{ cm}^3 = 0.001 \text{ m}^3$

Pauling electronegativities

Pauling electronegativity index

							Н										He
							2.1										
Li	Be											В	С	Ν	0	F	Ne
1.0	1.5											2.0	2.5	3.0	3.5	4.0	
Na	Mg											Αl	Si	Р	S	Cl	Ar
0.9	1.2											1.5	1.9	2.1	2.5	3.0	
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
0.8	1.0	1.3	1.5	1.6	1.6	1.5	1.8	1.8	1.8	1.9	1.6	1.6	2.0	2.0	2.4	2.8	
Rb	Sr	Υ	Zr	Nb	Мо	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
0.8	1.0	1.2	1.3	1.6	2.1	1.9	2.2	2.2	2.2	1.9	1.6	1.7	1.9	1.9	2.1	2.5	
Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Τl	Pb	Bi	Po	At	Rn
0.7	0.9	1.1	1.3	1.5	2.3	1.9	2.2	2.2	2.2	2.5	2.0	1.6	1.8	1.9	2.0	2.2	

Infrared spectroscopy

Correlation of infrared absorption wavenumbers with molecular structure

Group	Wavenumber range/cm ⁻¹
C-H stretching vibrations Alkane Alkene Alkyne Arene Aldehyde	2962-2853 3095-3010 3300 3030 2900-2820 and 2775-2700
C-H bending variations Alkane Arene 5 adjacent hydrogen atoms 4 adjacent hydrogen atoms 3 adjacent hydrogen atoms 2 adjacent hydrogen atoms 1 adjacent hydrogen atom	1485-1365 750 and 700 750 780 830 880
N-H stretching vibrations Amine Amide	3500-3300 3500-3140
O-H stretching vibrations Alcohols and phenols Carboxylic acids	3750-3200 3300-2500
C=C stretching vibrations Isolated alkene Arene	1669-1645 1600, 1580, 1500, 1450
C=O stretching vibrations Aldehydes, saturated alkyl Ketones alkyl Ketones aryl Carboxylic acids alkyl aryl Carboxylic acid anhydrides Acyl halides chlorides bromides Esters, saturated Amides	1740-1720 1720-1700 1700-1680 1725-1700 1700-1680 1850-1800 and 1790-1740 1795 1810 1750-1735 1700-1630
Triple bond stretching vibrations C≡N C≡C	2260-2215 2260-2100

The Periodic Table of Elements

0 (8)	(78) 4.0 He helium 2	20.2	N	neon 10	39.9	Αľ	argon 18	83.8	궃	krypton 36	131.3	Xe	xenon	24	[222]	~	radon 86		ted							
7	(17)	19.0	L	fluorine 9	35.5	บ	chlorine 17	79.9	Br	bromine 35	126.9	Ι	iodine	33	[210]	¥	astatine 85		een repor		175	Γn	lutetium 71	[257]	Lr Jawrencium	103
9	(16)	16.0	0	oxygen 8	32.1	s	sulfur 16	79.0	Se	selenium 34	127.6	Б	tellurium	70	[506]	& [polonium 84		116 have t		173	ΥÞ	ytterbium 70	[254]	No mobelium	102
22	(15)	14.0	z	nitrogen 7	31.0	۵	phosphorus 15	74.9	As	arsenic 33	121.8	Sb	antimony	5	209.0	<u>Б</u>	bismuth 83		tomic numbers 112-116 hav		169	T	thulium 69	[526]	Md	101
4	(14)	12.0	U	carbon	28.1	Si	silicon 14	72.6	g	germanium 32	118.7	Sn	ij.	25	207.2	<u>ዊ</u>]	lead 82		atomic nu		167	Ē	erbium 68	[253]	Fm fermium	100
м	(13)	10.8	ω	boron 5	27.0	Ι¥	aluminium 13	2.69	g	gallium 31	114.8	ū	indium	44	204.4	= =	thallium 81		Elements with atomic numbers 112-116 have been reported but not fully authenticated		165		holmium 67	[254]	Cf Es	66
							(12)	65.4	Zu	zinc 30	112.4	<u>გ</u>	cadmium	48	200.6	Ŧ	mercury 80				163	٥	dysprosium 66	[251]		
							(11)	63.5	J	copper 29	107.9	Ag	silver	4	197.0	Ϋ́	gold 79	[272]	Rg	111	159	P	terbium 65	[245]	Ber kelium	- 67
							(10)	58.7	Ë	nickel 28	106.4	Pd	palladium	40	195.1	₹ :	platinum 78	[271]	Ds		157	P 5	gadolinium 64	[247]	الله	
							(6)	58.9	ප	cobalt 27	102.9		£	42	192.2	-	iridium 77	[368]	Mt	109	152		europium 63	[243]	Am	95
	1.0 H hydrogen						(8)	55.8	Fe		101.1		풀	44	190.2	S.	osmium 76	[277]	Hserium	108	150		samarium 62	ľ	Pu plutonium	94
							(2)	54.9	۸	manganese 25	[86]		<u>fğ</u>	43	186.2	Se	rhenium 75		Bh		[147]	Pm	promethium 61	[237]	Np	93
		mass	poq	number			(9)	52.0	ъ	chromium 24	95.9	Wo	molybdenum	47	183.8	≥	tungsten 74	[997]	Seaborgiim	106	144	PX	neodymium 60		U	
	Key	relative atomic mass	atomic symbol	name atomic (proton) number			(5)	50.9	>	vanadium 23	92.9	g	niobium	4	180.9	<u>a</u>	tantalum 73	_	Dp		141	ዋ	praseodymium ne 59	[231]	Pa protactinium	91
		relat	atc	atomic			4	47.9	F	titanium 22	91.2	Zr	zirconium	40	178.5	Ξ:	hafnium 72	[261]	Rf	104	140	Ç	cerium 58	232	thorium	06
							(3)	45.0	Sc	scandium 21	88.9	>	yttrium	ξ	138.9	ra*	lanthanum 57	[227]	Ac*	89		es				
2	(2)	9.0	Be	beryllium 4	24.3	Mg	magnesium 12	40.1		calcium 20	87.6	'n	strontium	န	137.3	Ba	barium 56	[526]	Ra	88		* Lanthanide series	* Actinide series			
-	(1)	6.9	=	lithium 3	23.0	Na	sodium 11	39.1	<u>×</u>	potassium 19	85.5	&	rubidium 27	3/	132.9	ტ .	caesium 55	[223]	Fr francium	87		* Lant	* Actir			