

L2-CHEMMR



NEW ZEALAND QUALIFICATIONS AUTHORITY  
MANA TOHU MĀTAURANGA O AOTEAROA

QUALIFY FOR THE FUTURE WORLD  
KIA NOHO TAKATŪ KI TŌ ĀMUA AO!

## Te Mātauranga Matū, Kaupae 2, 2018

9.30 i te ata Rāhina 26 Whiringa-ā-rangi 2018

### PUKAPUKA RAUEMI

Tirohia tēnei pukapuka hei whakatutuki i ngā tūmahi o ō Pukapuka Tūmahi, Tuhiinga hoki.

Tirohia mēnā e tika ana te raupapatanga o ngā whārangi 2–5 kei roto i tēnei pukapuka, ka mutu, kāore tētahi o aua whārangi i te takoto kau.

**KA TAEA TĒNEI PUKAPUKA TE PUPURI HEI TE MUTUNGA O TE WHAKAMĀTAUTAU.**

**Ngā tikanga tātai mō 91164M: *Te whakaatu māramatanga ki te honohono, te hanga, ngā āhuatanga me ngā huringa pūngao***

$$n = cV$$

$$n = \frac{m}{M}$$

**Ngā tikanga tātai mō 91166M: *Te whakaatu māramatanga ki te tauhohehohe matū***

$$K_w = [\text{H}_3\text{O}^+][\text{OH}^-] = 1 \times 10^{-14} \text{ i te } 25^\circ\text{C}$$

$$\text{pH} = -\log[\text{H}_3\text{O}^+]$$

**Formulae for 91164: *Demonstrate understanding of bonding, structure, properties and energy changes***

$$n = cV$$

$$n = \frac{m}{M}$$

**Formulae for 91166: *Demonstrate understanding of chemical reactivity***

$$K_w = [\text{H}_3\text{O}^+][\text{OH}^-] = 1 \times 10^{-14} \text{ at } 25^\circ\text{C}$$

$$\text{pH} = -\log[\text{H}_3\text{O}^+]$$

# TE TAKA PŪMOTU

Tau Iraoho

																		1 <b>H</b> 1.0																				2 <b>He</b> 4.0												
																		Papatipu Rāpoi Ngota/ g mol <sup>-1</sup>																																
																		18																																
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36															
3	<b>Li</b> 6.9	<b>Be</b> 9.0	<b>B</b> 10.8	<b>C</b> 12.0	<b>N</b> 14.0	<b>O</b> 16.0	<b>F</b> 19.0	<b>Ne</b> 20.2	<b>Na</b> 23.0	<b>Mg</b> 24.3	<b>K</b> 39.1	<b>Ca</b> 40.1	<b>Sc</b> 45.0	<b>Ti</b> 47.9	<b>V</b> 50.9	<b>Cr</b> 52.0	<b>Mn</b> 54.9	<b>Fe</b> 55.9	<b>Co</b> 58.9	<b>Ni</b> 58.7	<b>Cu</b> 64.5	<b>Zn</b> 65.4	<b>Ga</b> 69.7	<b>Ge</b> 72.6	<b>As</b> 74.9	<b>Se</b> 79.0	<b>Br</b> 79.9	<b>Kr</b> 83.8	<b>Rb</b> 85.5	<b>Sr</b> 87.6	<b>Y</b> 88.9	<b>Zr</b> 91.2	<b>Nb</b> 92.9	<b>Mo</b> 95.9	<b>Tc</b> 98.9	<b>Ru</b> 101	<b>Rh</b> 103	<b>Pd</b> 106	<b>Ag</b> 108	<b>Cd</b> 112	<b>In</b> 115	<b>Sn</b> 119	<b>Sb</b> 122	<b>Te</b> 128	<b>I</b> 127	<b>Xe</b> 131				
37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	
<b>Fr</b> 223	<b>Cs</b> 133	<b>Ba</b> 137	<b>Lu</b> 175	<b>Hf</b> 179	<b>Ta</b> 181	<b>W</b> 184	<b>Re</b> 186	<b>Os</b> 190	<b>Ir</b> 192	<b>Pt</b> 195	<b>Au</b> 197	<b>Hg</b> 201	<b>Tl</b> 204	<b>Pb</b> 207	<b>Bi</b> 209	<b>Po</b> 210	<b>At</b> 210	<b>Rn</b> 222	<b>Fr</b> 223	<b>Ac</b> 227	<b>Th</b> 232	<b>Pa</b> 231	<b>U</b> 238	<b>Np</b> 237	<b>Pu</b> 239	<b>Am</b> 241	<b>Cm</b> 244	<b>Bk</b> 249	<b>Cf</b> 251	<b>Es</b> 252	<b>Fm</b> 257	<b>Md</b> 258	<b>No</b> 259	<b>Lr</b> 262	<b>Lr</b> 262	<b>Rf</b> 261	<b>Db</b> 262	<b>Sg</b> 263	<b>Bh</b> 264	<b>Hs</b> 265	<b>Mt</b> 268	<b>Ds</b> 271	<b>Rg</b> 272	<b>Cn</b> 277	<b>Nh</b> 113	<b>Fl</b> 114	<b>Mc</b> 115	<b>Lv</b> 116	<b>Ts</b> 117	<b>Og</b> 118

57	58	59	60	61	62	63	64	65	66	67	68	69	70
<b>La</b> 139	<b>Ce</b> 140	<b>Pr</b> 141	<b>Nd</b> 144	<b>Pm</b> 147	<b>Sm</b> 150	<b>Eu</b> 152	<b>Gd</b> 157	<b>Tb</b> 159	<b>Dy</b> 163	<b>Ho</b> 165	<b>Er</b> 167	<b>Tm</b> 169	<b>Yb</b> 173
89	90	91	92	93	94	95	96	97	98	99	100	101	102
<b>Te Raupapa Lanthanide</b>	<b>Ac</b> 227	<b>Th</b> 232	<b>Pa</b> 231	<b>U</b> 238	<b>Np</b> 237	<b>Pu</b> 239	<b>Am</b> 241	<b>Cm</b> 244	<b>Bk</b> 249	<b>Cf</b> 251	<b>Es</b> 252	<b>Fm</b> 257	<b>No</b> 259
<b>Te Raupapa Actinide</b>													

# PERIODIC TABLE OF THE ELEMENTS

18

Atomic number		Molar mass/g mol <sup>-1</sup>																																																					
	1															2																																							
	<b>H</b> 1.0															<b>He</b> 4.0																																							
1		2		3		4		5		6		7		8		9		10		11		12		13		14		15		16		17		18																					
3	<b>Li</b> 6.9	<b>Be</b> 9.0		<b>B</b> 10.8	<b>C</b> 12.0	<b>N</b> 14.0	<b>O</b> 16.0	<b>F</b> 19.0	<b>Ne</b> 20.2		<b>Na</b> 23.0	<b>Mg</b> 24.3		<b>Al</b> 27.0	<b>Si</b> 28.1	<b>P</b> 31.0	<b>S</b> 32.1	<b>Cl</b> 35.5	<b>Ar</b> 40.0		<b>K</b> 39.1	<b>Ca</b> 40.1		<b>Ga</b> 69.7	<b>Ge</b> 72.6	<b>As</b> 74.9	<b>Se</b> 79.0	<b>Br</b> 79.9	<b>Kr</b> 83.8		<b>Rb</b> 85.5	<b>Sr</b> 87.6		<b>In</b> 115	<b>Sn</b> 119	<b>Sb</b> 122	<b>Te</b> 128	<b>I</b> 127	<b>Xe</b> 131		<b>Cs</b> 133	<b>Ba</b> 137		<b>Tl</b> 204	<b>Pb</b> 207	<b>Bi</b> 209	<b>Po</b> 210	<b>At</b> 210	<b>Rn</b> 222						
37		<b>Y</b> 88.9	<b>Zr</b> 91.2	<b>Nb</b> 92.9	<b>Mo</b> 95.9	<b>Tc</b> 98.9	<b>Ru</b> 101	<b>Rh</b> 103	<b>Pd</b> 106	<b>Ag</b> 108	<b>Cd</b> 112	<b>In</b> 115	<b>Sn</b> 119	<b>Sb</b> 122	<b>Te</b> 128	<b>I</b> 127	<b>Xe</b> 131				<b>Fr</b> 223	<b>Ra</b> 226		<b>Ac</b> 227	<b>Th</b> 232	<b>Pa</b> 231	<b>U</b> 238	<b>Np</b> 237	<b>Pu</b> 239	<b>Am</b> 241	<b>Cm</b> 244	<b>Bk</b> 249	<b>Cf</b> 251	<b>Es</b> 252	<b>Fm</b> 257	<b>Md</b> 258	<b>No</b> 259		<b>Yb</b> 173	<b>Lu</b> 175		<b>La</b> 139	<b>Ce</b> 140	<b>Pr</b> 141	<b>Nd</b> 144	<b>Pm</b> 147	<b>Sm</b> 150	<b>Eu</b> 152	<b>Gd</b> 157	<b>Tb</b> 159	<b>Dy</b> 163	<b>Ho</b> 165	<b>Er</b> 167	<b>Tm</b> 169	<b>Yb</b> 173
55		<b>Lu</b> 175	<b>Hf</b> 179	<b>Ta</b> 181	<b>W</b> 184	<b>Re</b> 186	<b>Os</b> 190	<b>Ir</b> 192	<b>Pt</b> 195	<b>Au</b> 197	<b>Hg</b> 201	<b>Tl</b> 204	<b>Pb</b> 207	<b>Bi</b> 209	<b>Po</b> 210	<b>At</b> 210	<b>Rn</b> 222				<b>Fr</b> 223	<b>Ra</b> 226		<b>Ac</b> 227	<b>Th</b> 232	<b>Pa</b> 231	<b>U</b> 238	<b>Np</b> 237	<b>Pu</b> 239	<b>Am</b> 241	<b>Cm</b> 244	<b>Bk</b> 249	<b>Cf</b> 251	<b>Es</b> 252	<b>Fm</b> 257	<b>Md</b> 258	<b>No</b> 259		<b>Yb</b> 173	<b>Lu</b> 175		<b>La</b> 139	<b>Ce</b> 140	<b>Pr</b> 141	<b>Nd</b> 144	<b>Pm</b> 147	<b>Sm</b> 150	<b>Eu</b> 152	<b>Gd</b> 157	<b>Tb</b> 159	<b>Dy</b> 163	<b>Ho</b> 165	<b>Er</b> 167	<b>Tm</b> 169	<b>Yb</b> 173
87		<b>Lr</b> 262	<b>Rf</b> 261	<b>Db</b> 262	<b>Sg</b> 263	<b>Bh</b> 264	<b>Hs</b> 265	<b>Mt</b> 268	<b>Ds</b> 271	<b>Rg</b> 272	<b>Cn</b> 277	<b>Nh</b> 285	<b>Fl</b> 289	<b>Mc</b> 290	<b>Lv</b> 293	<b>Ts</b> 294	<b>Og</b> 294				<b>Fr</b> 223	<b>Ra</b> 226		<b>Ac</b> 227	<b>Th</b> 232	<b>Pa</b> 231	<b>U</b> 238	<b>Np</b> 237	<b>Pu</b> 239	<b>Am</b> 241	<b>Cm</b> 244	<b>Bk</b> 249	<b>Cf</b> 251	<b>Es</b> 252	<b>Fm</b> 257	<b>Md</b> 258	<b>No</b> 259		<b>Yb</b> 173	<b>Lu</b> 175		<b>La</b> 139	<b>Ce</b> 140	<b>Pr</b> 141	<b>Nd</b> 144	<b>Pm</b> 147	<b>Sm</b> 150	<b>Eu</b> 152	<b>Gd</b> 157	<b>Tb</b> 159	<b>Dy</b> 163	<b>Ho</b> 165	<b>Er</b> 167	<b>Tm</b> 169	<b>Yb</b> 173





*English translation of the wording on the front cover*

L2-CHEMR

## Level 2 Chemistry, 2018

9.30 a.m. Monday 26 November 2018

**RESOURCE BOOKLET**

Refer to this booklet to answer the questions in your Question and Answer Booklets.

Check that this booklet has pages 2–5 in the correct order and that none of these pages is blank.

**YOU MAY KEEP THIS BOOKLET AT THE END OF THE EXAMINATION.**