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L3–CHEMMR

993108

NZQA

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 3, 2021

PUKAPUKA RAUEMI

Tirohia tēnei pukapuka hei whakatutuki i ngā tūmahi o ō Pukapuka Tūmahi, Tuhinga 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 91390M: *Te whakaatu māramatanga ki ngā tikanga matūrewarau me ngā āhuatanga o ngā korakora me ngā matū*

$$n = cV$$

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

$$q = mc\Delta T \qquad \Delta_r H^\circ = \frac{-q}{n}$$

$$\Delta_r H^\circ = \Sigma \Delta_f H^\circ(\text{ngā hua}) - \Sigma \Delta_f H^\circ(\text{ngā pūmatū hohe})$$

Ngā tikanga tātai mō 91392M: *Te whakaatu māramatanga ki ngā mātāpono taurite i ngā pūnaha waiwai*

$$\text{pH} = -\log\left[\text{H}_3\text{O}^+\right] \qquad \left[\text{H}_3\text{O}^+\right] = 10^{-\text{pH}}$$

$$K_\text{w} = \left[\text{H}_3\text{O}^+\right]\left[\text{OH}^-\right] = 1\times10^{-14} \text{ i te } 25^\circ\text{C}$$

$$\text{p}K_\text{a} = -\log K_\text{a} \qquad K_\text{a} = 10^{-\text{p}K_\text{a}}$$

$$K_\text{a} = \frac{\left[\text{H}_3\text{O}^+\right]\left[\text{A}^-\right]}{\left[\text{HA}\right]}$$

$$K_\text{s} = s^2 \qquad K_\text{s} = 4s^3$$

$$n = cV$$

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

Ngā katote tuatini mō 91392M: *Te whakaatu māramatanga ki ngā mātāpono taurite i ngā pūnaha waiwai*

$[Ag(CN)_2]^-$	$[Ag(NH_3)_2]^+$
$[Al(OH)_4]^-$	$[Cu(NH_3)_4]^{2+}$
$[Pb(OH)_4]^{2-}$	$[Zn(OH)_4]^{2-}$
$[Zn(NH_3)_4]^{2+}$	$[Ni(NH_3)_6]^{2+}$
$[Ni(CN)_4]^{2-}$	

Formulae for 91390: *Demonstrate understanding of thermochemical principles and the properties of particles and substances*

$$n = cV$$

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

$$q = mc\Delta T \qquad \Delta_r H^\circ = \frac{-q}{n}$$

$$\Delta_r H^\circ = \Sigma \Delta_f H^\circ(\text{products}) - \Sigma \Delta_f H^\circ(\text{reactants})$$

Formulae for 91392: *Demonstrate understanding of equilibrium principles in aqueous systems*

$$\text{pH} = -\log\left[\text{H}_3\text{O}^+\right] \qquad \left[\text{H}_3\text{O}^+\right] = 10^{-\text{pH}}$$

$$K_\text{w} = \left[\text{H}_3\text{O}^+\right]\left[\text{OH}^-\right] = 1\times10^{-14} \text{ at } 25\ ^\circ\text{C}$$

$$\text{p}K_\text{a} = -\log K_\text{a} \qquad K_\text{a} = 10^{-\text{p}K_\text{a}}$$

$$K_\text{a} = \frac{\left[\text{H}_3\text{O}^+\right]\left[\text{A}^-\right]}{\left[\text{HA}\right]}$$

$$K_\text{s} = s^2 \qquad K_\text{s} = 4s^3$$

$$n = cV$$

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

Complex ions for 91392: *Demonstrate understanding of equilibrium principles in aqueous systems*

$[Ag(CN)_2]^-$	$[Ag(NH_3)_2]^+$
$[Al(OH)_4]^-$	$[Cu(NH_3)_4]^{2+}$
$[Pb(OH)_4]^{2-}$	$[Zn(OH)_4]^{2-}$
$[Zn(NH_3)_4]^{2+}$	$[Ni(NH_3)_6]^{2+}$
$[Ni(CN)_4]^{2-}$	

TE TAKA PŪMOTU

																	18
						Tau Iraoho	1 **H** 1.0										2 **He** 4.0
1	*2*						Papatipu ngota hāngai					*13*	*14*	*15*	*16*	*17*	
3 **Li** 6.9	4 **Be** 9.0											5 **B** 10.8	6 **C** 12.0	7 **N** 14.0	8 **O** 16.0	9 **F** 19.0	10 **Ne** 20.2
11 **Na** 23.0	12 **Mg** 24.3	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	13 **Al** 27.0	14 **Si** 28.1	15 **P** 31.0	16 **S** 32.1	17 **Cl** 35.5	18 **Ar** 40.0
19 **K** 39.1	20 **Ca** 40.1	21 **Sc** 45.0	22 **Ti** 47.9	23 **V** 50.9	24 **Cr** 52.0	25 **Mn** 54.9	26 **Fe** 55.9	27 **Co** 58.9	28 **Ni** 58.7	29 **Cu** 63.6	30 **Zn** 65.4	31 **Ga** 69.7	32 **Ge** 72.6	33 **As** 74.9	34 **Se** 79.0	35 **Br** 79.9	36 **Kr** 83.8
37 **Rb** 85.5	38 **Sr** 87.6	39 **Y** 88.9	40 **Zr** 91.2	41 **Nb** 92.9	42 **Mo** 95.9	43 **Tc** 98.9	44 **Ru** 101	45 **Rh** 103	46 **Pd** 106	47 **Ag** 108	48 **Cd** 112	49 **In** 115	50 **Sn** 119	51 **Sb** 122	52 **Te** 128	53 **I** 127	54 **Xe** 131
55 **Cs** 133	56 **Ba** 137	71 **Lu** 175	72 **Hf** 179	73 **Ta** 181	74 **W** 184	75 **Re** 186	76 **Os** 190	77 **Ir** 192	78 **Pt** 195	79 **Au** 197	80 **Hg** 201	81 **Tl** 204	82 **Pb** 207	83 **Bi** 209	84 **Po** 210	85 **At** 210	86 **Rn** 222
87 **Fr** 223	88 **Ra** 226	103 **Lr** 262	104 **Rf** 261	105 **Db** 262	106 **Sg** 263	107 **Bh** 264	108 **Hs** 265	109 **Mt** 268	110 **Ds** 271	111 **Rg** 272	112 **Cn** 277	113 **Nh**	114 **Fl**	115 **Mc**	116 **Lv**	117 **Ts**	118 **Og**

Raupapa Lanthanide	57 **La** 139	58 **Ce** 140	59 **Pr** 141	60 **Nd** 144	61 **Pm** 147	62 **Sm** 150	63 **Eu** 152	64 **Gd** 157	65 **Tb** 159	66 **Dy** 163	67 **Ho** 165	68 **Er** 167	69 **Tm** 169	70 **Yb** 173
Raupapa Actinide	89 **Ac** 227	90 **Th** 232	91 **Pa** 231	92 **U** 238	93 **Np** 237	94 **Pu** 239	95 **Am** 241	96 **Cm** 244	97 **Bk** 249	98 **Cf** 251	99 **Es** 252	100 **Fm** 257	101 **Md** 258	102 **No** 259

PERIODIC TABLE OF THE ELEMENTS

Atomic number

Relative atomic mass

1	*2*											*13*	*14*	*15*	*16*	*17*	*18*
						1 **H** 1.0											2 **He** 4.0
3 **Li** 6.9	4 **Be** 9.0											5 **B** 10.8	6 **C** 12.0	7 **N** 14.0	8 **O** 16.0	9 **F** 19.0	10 **Ne** 20.2
11 **Na** 23.0	12 **Mg** 24.3	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	13 **Al** 27.0	14 **Si** 28.1	15 **P** 31.0	16 **S** 32.1	17 **Cl** 35.5	18 **Ar** 40.0
19 **K** 39.1	20 **Ca** 40.1	21 **Sc** 45.0	22 **Ti** 47.9	23 **V** 50.9	24 **Cr** 52.0	25 **Mn** 54.9	26 **Fe** 55.9	27 **Co** 58.9	28 **Ni** 58.7	29 **Cu** 63.6	30 **Zn** 65.4	31 **Ga** 69.7	32 **Ge** 72.6	33 **As** 74.9	34 **Se** 79.0	35 **Br** 79.9	36 **Kr** 83.8
37 **Rb** 85.5	38 **Sr** 87.6	39 **Y** 88.9	40 **Zr** 91.2	41 **Nb** 92.9	42 **Mo** 95.9	43 **Tc** 98.9	44 **Ru** 101	45 **Rh** 103	46 **Pd** 106	47 **Ag** 108	48 **Cd** 112	49 **In** 115	50 **Sn** 119	51 **Sb** 122	52 **Te** 128	53 **I** 127	54 **Xe** 131
55 **Cs** 133	56 **Ba** 137	71 **Lu** 175	72 **Hf** 179	73 **Ta** 181	74 **W** 184	75 **Re** 186	76 **Os** 190	77 **Ir** 192	78 **Pt** 195	79 **Au** 197	80 **Hg** 201	81 **Tl** 204	82 **Pb** 207	83 **Bi** 209	84 **Po** 210	85 **At** 210	86 **Rn** 222
87 **Fr** 223	88 **Ra** 226	103 **Lr** 262	104 **Rf** 261	105 **Db** 262	106 **Sg** 263	107 **Bh** 264	108 **Hs** 265	109 **Mt** 268	110 **Ds** 271	111 **Rg** 272	112 **Cn** 277	113 **Nh**	114 **Fl**	115 **Mc**	116 **Lv**	117 **Ts**	118 **Og**

Lanthanide Series	57 **La** 139	58 **Ce** 140	59 **Pr** 141	60 **Nd** 144	61 **Pm** 147	62 **Sm** 150	63 **Eu** 152	64 **Gd** 157	65 **Tb** 159	66 **Dy** 163	67 **Ho** 165	68 **Er** 167	69 **Tm** 169	70 **Yb** 173
Actinide Series	89 **Ac** 227	90 **Th** 232	91 **Pa** 231	92 **U** 238	93 **Np** 237	94 **Pu** 239	95 **Am** 241	96 **Cm** 244	97 **Bk** 249	98 **Cf** 251	99 **Es** 252	100 **Fm** 257	101 **Md** 258	102 **No** 259

English translation of the wording on the front cover

L3–CHEMMR

Level 3 Chemistry, 2021

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.